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Social Constructivist Activities for Teaching Computer Networking in Information Systems

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Abstract

The computer networking course, traditionally known as telecommunications, is essential to the IS curriculum, because it lays the foundation for information security and cyber security in modern networks. Throughout many years of teaching this course, I have seen students struggle to engage with technical material such as the TCP/IP stack, IP addresses, subnetting, and network interfaces. Today's digital natives, who have never seen an Ethernet cable, much less made one, generally take the Internet for granted. Students have told me the material can be dry, boring or confusing. Despite using the Internet every day of their lives, students entering the course are unfamiliar with core concepts. This article describes select activities that I use in the course based on principles of social constructivism to make the material more engaging and easier to absorb. These activities capture students' interest from the first day, maintain motivation throughout, and encourage curiosity to engage more deeply with the material. Feedback from students reflects how these activities shifted their initial perceptions and helped them learn. This article contributes to pedagogical research on how to improve teaching and learning in the telecom course within a business information systems curriculum.

Keywords: Telecommunications, social constructivism, student engagement, active learning, data communications

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1. INTRODUCTION

The Internet undergirds modern work and everyday life. In May 2026, a group of hackers took credit for taking down Instructure, the company that hosts Canvas, a widely used learning management system in universities and K-12 schools. The hackers timed their attack towards the end of the university semester, and in doing so, brought millions of students' and instructors' lives to a brief halt for half a day (Park et al., 2026). Events like this – supercharged by the prevalence of AI-enhanced hacking tools – continue to fuel the persistent need for information security (InfoSec) professionals. Computer networking is fundamental to training those professionals (Buckman, 2025). Without a solid understanding of how networks work and how people and technologies interact, InfoSec professionals cannot readily identify and combat threats to organizations' information technology (IT) infrastructure. This course teaches students what that infrastructure is, how it's connected to the wider world, and how it works.

The 2020 Information Systems (IS) Model Curriculum identifies IT infrastructure as a required core competency for IS students (Leidig et al., 2021). The 2020 Model Curriculum further posits that students should understand the components of client/server and wired networks, be able to analyze components of a network, and to apply wireless protocols. Further, students should understand the layers of the Transmission Control Protocol (TCP)/Internet Protocol (IP) protocol suite and Open Systems Interconnection (OSI) model, as well as the responsibilities of each layer. These competencies are primary learning objectives of the computer networking course. Although most students have used the Internet every day of their lives, and they know that information security is important, they have not spent much time thinking about or learning how networks function, how networks work together, or their impacts on every day life. For example, many of their devices connect wirelessly, and students do not realize that those wireless devices still connect to a physical network.

Further compounded by their novelty to students, topics such as IP addresses, ports, and protocols are not nearly as engaging as glamorized topics like hacking, social engineering, and pen-testing. Minimally-engaged students are less likely to complete the reading, attend class, or engage in class, which begets the question, how can an instructor make dry topics filled with abstract, esoteric acronyms like DNS (Dynamic Name Service) stick? While the issue of engaging students with boring material is not new, making computer science topics palatable to business students is a unique property of information systems curricula. One potential strategy to make abstract concepts more engaging and interesting is to relate them to students' lived experiences and connect them to larger societal issues that students care about (Gay, 2018). Another active learning strategy to make unfamiliar material more relatable is to encourage discussion and debate around complex topics. One such approach, social constructivism, is a student-centered learning approach whereby students are given the opportunity to construct knowledge together and practice applying that learning (Chaiklin, 2003).

In this paper, I describe a series of activities that I use in the computer networking course loosely based on principles of social constructivist learning theory. Students report that these activities are useful, helpful, and worth doing. Since adopting these activities, students generally provide more positive feedback on student evaluations. More surprisingly, students are able to recall the TCP/IP and OSI models from memory and want to learn more about networks, well after the course ends. This paper contributes to research on how to make this course more engaging and interesting for IS students, in order to better meet the competencies outlined in the 2020 IS Model Curriculum related to IT infrastructure (Leidig et al., 2021). Although IS educational research has widely covered how to teach the introduction to programming (A. J. Connolly & Mutchler, 2021; He & Yen, 2014; Jiang, 2022; Law, 2013; Menon, 2023; Zhang et al., 2020), introduction to information systems (A. J. Connolly et al., 2022; Gudigantala, 2013; Law, 2013), systems analysis and design (Magana et al., 2018), project management (Baird & Riggins, 2012; A. J. Connolly & Reinicke, 2017; Rush & Connolly, 2020), InfoSec

(Mutchler et al., 2024), and other core courses in IS, few if any researchers have chosen to share how they make the networking course more interesting. This gap may perhaps be due to the shifting role of the course in IS curricula (Hawk, 2005). The next section briefly explains social constructivism as it relates to pedagogical practice and previous uses of this approach in IS courses, followed by a description of select activities with this approach, and finally, a brief discussion of outcomes and the contributions of this paper.

2. SOCIAL CONSTRUCTIVISM

Social constructivism is an active learning strategy that encourages students to work together to build learning. Each student can only learn and do so much on their own; this level is their comfort zone. Outside their comfort zone is the student's zone of proximal development (ZPD), where deeper learning occurs. In the ZPD, students learn from others through scaffolding, socialization, and dialogue (Chaiklin, 2003; John-Steiner & Mahn, 1996; McLeod, 2018). Despite copious evidence showing that active learning is effective versus traditional lecture, faculty continue to rely primarily on lecture (Burch et al., 2015; Prince, 2004; Vercellotti, 2018). However, today's digital natives grew up with technology; as such, they appreciate interacting with each other with or through technology rather than sitting passively, listening to lectures (Guo et al., 2013; Mandviwalla & Schuff, 2014; Vodanovich et al., 2010). "By interacting with others, students get the opportunity to share their views and thus generate a shared understanding related to the concept" (Kalpana, 2014, p. 28). A social "constructivist approach has a primary goal: helping students learn "how to learn" which fosters critical thinking. Further, it builds learners who are more motivated and independent" (Kalpana, 2014, p. 28). InfoSec professionals, particularly as automated tools become more prevalent, will need critical thinking skills and the ability and desire to continue to learn independently. These skills are even more crucial for IS graduates as automated tools take over rote tasks. Thus, a social constructivist approach makes sense as an active learning strategy to build skills.

Little research has examined how to apply social constructivist learning to IS courses, despite the importance of active learning. Connolly & Begg (2006) discuss their "approach motivated by principles found in the constructivist epistemology" which they found useful in the database course to help students with the "abstract and complex" material (p. 43). Similar to database, the networking course also has abstract and complex material. Connolly, et al. (2022) used a socio-cultural approach to make the introduction to IS course more engaging, which is somewhat similar, but for a different course. These limited examples suggest a wide gap in IS pedagogical research.

Even less IS research provides examples of how to teach the networking course in an IS curriculum in a business school. Searches specifically of Journal of IS Education (JISE) found few articles related to telecommunications or networking, all published prior to 2015. For example, Gendron & Jarmoszko (2003) discuss a semester-long project simulation. While valuable, the project itself is outdated, and they do not address the day-to-day teaching of the course to keep students interested. Similarly outdated for today's networking material, Goldman (1994) discusses the transition from mainframes to distributed client/servers, the effects on the telecom course, and how to position the course in an IS curriculum. Note that the Internet became mainstream shortly afterwards. One of the most recent examples, Chen & Brabston (2011), also provides examples of projects to prepare students but does not discuss the day-to-day. A similarly dated example, Pandya (2004), states that one challenge of teaching this course is the hardware preparation involved, because "hands-on experience with networking hardware and software is essential to grasp the data networking concepts" (p. 113). While this may have been true in 2004, a few things have changed since then. For example, CISCO offers free virtual tools and lessons for students which require minimal setup. Even so, hands-on activities do not help students think through the broader societal and ethical implications of these technologies, and before they can do any of that, they need to have a firm grasp of the basic tenets, such as TCP/IP and OSI models, layering, and protocols.

While it is important to understand networks, students cannot easily learn the basic material in isolation; they need a "hook" to see the importance and scaffolding to guide them in learning how to learn. Thus, to get students to shift from their comfort zones to their ZPDs and encourage deeper learning, I created a series of activities in the networking course based on social constructivist theory. These activities start simple and become more complex as the course progresses (scaffolding). The activities encourage students to think about the broader issues involved with the Internet and networking technologies, such

as digital divide and environmental impacts (socialization). Most activities involve independent research followed by discussion, first in small groups, then as a class (dialogue). These activities start from Day One and the themes persist throughout the course.

3. SELECT ACTIVITIES IN THE COMPUTER NETWORKING COURSE

The networking course is required for third-year IS majors and can serve as an elective for IS minors. It generally covers introductory principles of how telecommunications and computer networks function. This material includes mobile and landline phone networks, Internet of Things, protocols at every layer, and more. This course covers most devices that connect to other devices, including what it is and how it works. There are a lot of acronyms to memorize; some mean different things depending on the context in which they're used; and students can get lost very quickly if they're not interested in the material. However, this course material is crucial for further courses or careers related to InfoSec and IT infrastructure. It is vital for IS graduates to not only learn the material and engage with it, but recognize the broader societal impacts, because their decisions will change society for decades to come. For example, some reports suggest that the Internet is not only shrinking but filling up with garbage nobody wants to read (Yan, 2024). As future users of that Internet and those networks who might be in a position to change them, IS students should understand how those networks operate.

When I first taught the networking course, I primarily used lectures and slides, occasionally encouraging students to discuss select topics. This Socrative method was comfortable for me, but the material itself was less exciting for students. Much of the material sounds obvious on its face, such as that Domain Name Service (DNS) is used to register website domain names so our browser can connect to an IP address. For example, we use DNS to connect to Netflix without knowing the IP address of the closest streaming server. This technical explanation is not as exciting as the latest series on Netflix, such as the phenomenon of Stranger Things. To make the topic of DNS more engaging, we might first define what it is and then discuss why, without load balancing and server mirroring, the Internet slows down every evening between 7 and 11 pm EST (especially during new releases) (Watanuki, 2025).

3.1 First Day Activity – Digital Divide

On the first day of class before I review the syllabus, I ask students to raise their hand if they don't use the Internet. (No one raises their hand.) I then ask, who hasn't used the Internet TODAY? (Again, no one raises their hand. A few chuckle. Some are using it while I'm talking.) Finally, I ask who would be OK without Internet. Why or why not? Most students, with few exceptions, recognize that life as they know it requires Internet access, but few know how it works. At this point, I state the crux of the course, which is to learn how the Internet works. Next, (while I rarely show videos during ANY classes), in this course on the first day, I show a one-minute YouTube video from A&E related to the lack of broadband access in Marion County, SC (A&E, 2021). It is short, to the point, and poignant. After showing the video, we discuss what digital divide means, why it matters, how to define broadband, who defines broadband, and where Marion County is (a rural area of South Carolina in the US). This discussion immediately puts into context the concepts in the course and makes them feel real. It situates our further discussions of the Internet within broader societal issues. Although many students have heard of digital divide and broadband, they are not aware that broadband speeds are defined by governments, not by commercial providers, and that changing the definition can affect what people have access to in their homes or businesses. Until this point, students have taken Internet and broadband access for granted. The connection of a dry topic to a real person's story makes that topic more salient.

3.2 Discussion Topics and Practice Worksheets

See Appendix A for a list of topics and their corresponding discussions used in the class for more inspiration. Each of these activities, discussions, and assignments can be ported into an introduction to computer networking course with little preparation. For example, I created practice worksheets to walk students through the basic calculations to convert from decimal numbers to binary (and vice-versa) and to design subnets and their corresponding subnet masks. The binary to decimal worksheet is also useful in introduction to programming and introduction to management information systems. Students know ahead of time to expect at least one exam question on these topics, typically four points of short answer. Business students can be put off or discouraged by math, particularly anyone experiencing stereotype bias (Taylor & Walton, 2011). Thus, a simple and straightforward worksheet to explain and practice

calculations helps students feel more confident so they can succeed. I have not included the binary practice worksheet in this article, because it is available in the Instructor Resources to the textbook Business Data Communications & IT Infrastructures by Agrawal, et al. (2026). Similarly, I provide practice worksheets for subnetting and subnet masks, also available in the Instructor Resources in Agrawal, et al. (2026).

3.3 Cementing TCP/IP Stack and OSI Model Layers – Three Part Exercise

The TCP/IP stack and OSI models are the foundation on which everything else rests. These models put the protocols that run the Internet into context, because each protocol operates at a different layer. Without knowing the layers and what they do, it becomes harder to understand the protocols. Thus, I have scaffolded a series of three activities to help students remember the TCP/IP stack and OSI model layers. In Chapter 1 in the first week, the first activity asks students to team up in groups to design a mnemonic to memorize the 7 layers of the OSI model. This exercise is fairly common, but when students create the mnemonic themselves rather than looking it up, the mnemonic is easier for them to remember because it has more meaning to them. (My exams are completely on paper.) Students are warned that in the next class period they will have to draw the models on the board. This is the second activity, conducted in the next class meeting. I draw two large empty rectangles on the board, and invite students one-by-one to come to the board, draw and label the models for the class. If the student at the board gets stuck or only wants to complete part of a model, they can ask the audience for help or pass the marker to someone else. Students who cannot remember the layers are reminded of their mnemonics. My favorite (which I found online, from bottom to top) is "Please Do Not Teach Stupid People Acronyms."

The third activity provides a brief review for the first exam. The first exam covers the importance of networks, the OSI model, the TCP/IP model, responsibilities of Layers 1 through 4, and the protocols therein. This activity is a card sort puzzle. I allot most of the class period for students to work this activity. Students work in teams of three to five students (larger teams are possible if they have room to move around the room). Teams work at their own pace. Each team first receives an envelope labeled "Models" with 16 index cards. The cards are labeled with the names of the 5 layers in the TCP/IP model and the 7 layers in the OSI model, the words "TCP/IP stack" and "OSI model" for titles, along with a blank card and a card with a line drawn through the middle. Teams must work together to build and label the two models side-by-side in order to clearly show which layers in TCP/IP correspond to the layers in OSI. See Appendix B for a picture of the solution. Once they finalize the models and I approve they are accurate, teams receive a second envelope of "protocols". Each card has a term on it, mostly acronyms such as HTTP, DNS, CRC, etc. The teams review the cards, discuss what each term is, what it means, what it does, and what layer it belongs to. Each protocol card is placed next to the layer to which it corresponds. I then walk around and approve whether the teams have the protocols and functions associated with the right layers. See Appendix C for a picture of the solution. Students are allowed to use their notes and other resources if they choose and they keep trying until the solutions are correct. Once their solutions are complete and correct, the teams are encouraged to take a picture to study from, as well as talk about what acronyms and concepts they didn't understand while doing the exercise. Students frequently comment after this exercise, "I didn't know what I didn't know, but now I know what to study." This activity works like a study guide and an in-class study group in one. Students find it very useful and enjoy doing it.

I do not have a similar activity for the second exam, although I am still considering how to make one. Students are generally more nervous before the first exam because they don't know how I will test them on the material and there is a lot of material. The card sort activity helps reduce their anxiety so they can focus on how to learn. It also helps them put the material into a meaningful nomological net. By connecting each protocol and function to its respective layer, they are building a mental image of the material, which strengthens memory and recall (Commodari et al., 2024). Further, this activity provides a concrete touchpoint for abstract concepts, in line with social constructivist theories of learning (McLeod, 2025). With the core concepts firmly implanted in students' memories, they can build more complex models as we progress through the course.

3.4 Building a Patch Cable and Writing Up Lab Assignments

Students' favorite in-class activity involves creating an Ethernet patch cable. They are given a one-foot length of CAT-5 Ethernet cable and RJ-45 plugs to attach to either end, along with clear written

instructions, a corresponding YouTube video to watch (if they choose), and tools to attach the RJ-45 plug to the cable to make it work. Students work in pairs, and each student wires one end of the cable. Once crimped, the cable is tested to see if it works properly. The tester device shows students how signals are sent across each of the eight wires in the cable from one end to the other. If the cable does not work and there is time left in the class, students can cut off the mis-wired RJ-45 plug and try again, if they wish. They are also shown a correct cable on the tester if theirs does not work. The cable does not have to work to get credit for the exercise, because the goal of the exercise is to learn how a patch cable is made and how signals are sent over a wire. Once the initial tools are in stock (students can share tools as they need them), this activity requires minimal costs to serve hundreds of students over multiple years. The primary ongoing cost is the 100 packs of RJ-45 plugs (less than $20).

Students then write up their experience, what they did, and what they learned in a lab report. I provide a lab report template that they use for all lab assignments (some labs are in-class and others are out of class). The lab report template is based on a lab report that students might use in a physical sciences course such as physics or chemistry. The template has headings listed down the left side of a table with instructions on the right side for each section. Students delete the instructions and write their answers on the right side of the table. The headings for the template are name, title of lab, learning objectives, expected outcomes, materials used, steps taken, results, importance and notes. Learning objectives come from the syllabus, and students have to decide which ones the lab fulfills. This section encourages students to read the learning objectives in the syllabus carefully. The notes section is for students to add anything they want to share that doesn't fit in other boxes. The whole report need not go over a page, maybe two. For the cabling lab, I allow students to write the report together if they choose, but both students must submit the report to receive credit.

Other activities in the course (see Appendix A) include class discussions on social and ethical issues surrounding course material. I have other activities, discussions, and assignments in this course, but for brevity, I have selected only a select few to discuss in detail. This course also includes out-of-class lab assignments and a team project. There are two exams and a cumulative final. In the next section, I discuss some of the feedback I have received from students about these activities, which provides some evidence that the activities have been effective, although a more thorough analysis might yield additional insights in the future.

4. EVIDENCE

At my current institution, I have taught this course seven times from 2021 to 2025, generally with two sections per semester, face-to-face. Each section has between 20 to 35 students enrolled. Previous to 2021, while a doctoral candidate, I taught this course twice to a different audience of students. The reason I designed these activities was to overcome some of the difficulties that students expressed with the course material. I applied the social constructivist approach to learning, because it better met students' needs and it makes the material more engaging. For example, a student who wrote "My only negative opinions of this course were because I didn't like the subject personally" versus another student who wrote "I don't really like the network side of the major, but this class was still one of my favorites from the semester." At the very least, students appreciate the social approach to learning offered by the social constructivist approach. Some comments with this theme include: "the discussions always helped me learn more"; please add "more discussion-based lectures. I feel I learned best in those"; "I like the in–class–labs and social time"; and "I liked how open the class was for discussion." These comments suggest that students appreciated learning through socialization, which is one of the pillars of social constructivism.

More importantly, these activities have helped students learn difficult, abstract topics, of which there is a lot, as evidenced by comments such as "I learned quite a bit from this course, probably more new material than I have in any of my other current classes." One student wrote, "there's a lot more to networks than I initially thought." Students remember the scaffolded activities to learn the TCP/IP and OSI models, as evidenced by these comments: "I really enjoyed learning about the layers (TCP MODEL)", "I enjoyed learning about the TCP and OSI Models," and "Professor's activities when preparing for the tests were very helpful." Furthermore, when I've had students take one of my other courses after taking this one, they could still name all of the layers in the TCP/IP and OSI models from memory, up to one year after completing the course. More than one student has reported that they earned a job because they were "the only candidate who could explain the TCP/IP model, much less knew what it is."

I've also had students get jobs at Cisco Systems (one of the largest computer networking companies in the world). Two of these students came back to speak to my class in Spring 2025 about Cisco certifications, and what they gained from taking my course.

Students also frequently remark about the cabling lab. Comments in this vein include: "Do more labs like the Ethernet cable lab." "I enjoyed the in class lab where we build ethernet cables." "I loved the hands on labs at the beginning of the semester." "I liked the hands on exercises in some of the classes." "The in class labs were an integral part of my learning the course material and I really enjoyed them." Although some students walk away from the cabling lab better appreciating their degrees (because they don't have to build cables for a living), most students find it quite novel. "The ethernet lab was actually fun." While some instructors shy away from making learning "fun", neuroscience shows that serious fun can lead to deeper motivation and learning (Lowry et al., 2013; Willis, 2006).

Also important to course outcomes, particularly the need for InfoSec professionals to become lifelong learners, student comments reflect that the approach to teaching the course is contributing to their desire to keep learning about network infrastructure, which proponents of the 2020 IS Model Curriculm will appreciate. For example, a student wrote, "I really enjoyed the course and hope that there will be an opening for the next level of computing networks." Another comment reads "I learned a lot about networking and am considering it a career after taking this class." Students could connect the course with their daily lives, such as: "The material was surprisingly interesting for me, and it explained a lot of things we learn in other classes and use in real life." Another student wrote, "[The course] made me think about devices I use every day in a different way." And finally, "This was my favorite and the most interesting course I took this semester."

While comments from student evaluations can sometimes be a mixed-bag, these positive comments all reflect that the social constructivist activities made an impact on students. They remembered activities from the beginning of the semester, they recognized that these activities helped them learn and engage more deeply with the material, and they left the course wanting to engage further with material that might be considered dry and boring. Through the card sort activity, students were able to build a nomological net of the functions and protocols of the TCP/IP stack, which helped them put the material into a broader context, particularly as the course progressed to more complex topics. By the end of the course, students are able to speak coherently and intelligently about networks and IT infrastructure to a business audience. Equally importantly, they are able to take what they've learned in the course and build on it.

5. CONCLUSION

This paper discussed in detail some of my secret sauce for teaching computer networking to IS students in a business curriculum. IS students, unlike computer science or IT students, are less likely to care about technical components, especially those that involve hardware and software. Business majors are more predisposed to focus on how people use technology, rather than the nuts and bolts of how the technology works. For some students, the Internet is magic – it "just works," so who cares? Long ago, in a naïve attempt to provide a reason to care, I used a recurring theme that we should learn how networks operate so we could rebuild it in the case of a zombie apocalypse (The Walking Dead was popular back then). However, students did not find that reason to be sufficiently compelling. Thus, I pivoted.

The computer networking course is a first step for InfoSec careers. It is fundamental to InfoSec to understand how networks operate, how to administer them, and how people use them. Without a basic understanding of networking concepts such as the TCP/IP model, it is more difficult for students to gain access to entry-level IT positions. Although IT infrastructure is identified as a core competency in the 2020 IS Model Curriculum, not all IS programs teach it with depth or in context. "Brain dump" after semester's end is a well-known phenomenon, even though the ability to recall basic information is vital for future comprehension. However, students who are well-prepared for job interviews are able to remember what they learned in their IS classes, how to apply that knowledge, and how to further learn. They stand out from other job candidates. Dry, boring material is difficult to remember, but material that is learned in context and in relation to interesting material, is more likely to be recalled and possibly even enjoyed.

I presented select activities that I use in the computer networking course based on a social constructivist approach. Through scaffolding, socialization, and dialogue with peers, students are guided through real world examples. They are encouraged to put the material into context and develop a broader nomological net to describe, engage with and remember the material. They are given multiple opportunities to practice learning in a social setting with peers. Through this active learning approach, students are better able to engage and learn the material. Although these exercises were primarily done in-person, they could lend themselves to online presentations as well. For example, the card sort puzzle could be completed with an online Whiteboard.

As students enter careers and grapple with the impacts of dynamic automated tools, they need firm ground on which to stand. One part of that background includes a strong understanding of how IT infrastructure is put together, how it works, and its impacts on people's daily lives. IS professionals need to recognize that (like science) technology is not and has never been a neutral tool (Iaccarino, 2001; Zuboff, 2019), and automation in network infrastructure has only exacerbated these ethical dilemmas, such as the regulation of driverless cars (Young, 2025). These societal, ethical issues are growing ever more complicated as the infrastructure is hidden away, but IS professionals with a firm understanding of how networks work, particularly how the layers of a network work together, will be in a better position to evaluate and possibly address these issues. By thinking through how network infrastructures work, how they're governed, and how they impact people and society, students can better learn difficult, complex and abstract material. In doing so, hopefully, they will become more productive, active members of the IS field.

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APPENDIX A.

Course Topics by Week, Discussions and In-Class Activities

In this course, I augment the material from the third edition of Business Data Communications & IT Infrastructures from Agrawal and Daniel (2020). I plan to revise this list when I next teach this course, because Prospect Press released an updated fourth edition in 2026. I have also identified gaps I'd like to fill in the presentations. Most topics are also supported by homework activities and a team project.

Week	Topic	Discussions and In-Class Activities
1	Models and Overview	Digital divide and draw models on the white board
2	Physical Layer (L1)	List natural disasters and wire a patch cable
3	Data Link Layer (L2)	N/A
4	Network Layer (L3)	Binary practice worksheet
5	Transport Layer (L4)	Card Sort exercise
6	Application Layer (L5)	Discuss dark patterns and ad-blockers; view HTML in browser
7	Support Services	N/A
8	Routing & Subnetting	Subnet practice worksheet
9	Wide Area Networks	N/A
10	Wireless Networks	Find and discuss weirdest use of IoT devices
11	Phone Networks	Ethics of tracking location by cell tower
12	Cloud & Block Chain	Blockchain demo from Anders Brown Worth
13	Information Security	CyberSeek job search; Find examples of worst data breaches and what caused them; what ethical responsibilities do companies have to report?
14	DevOps & Services Delivery	Discuss role of IT in the business – commodity or competitive advantage; cost or profit center?

Table 1. Course Topics by Week, Discussions, and In-Class Activities

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APPENDIX B.

Card Sort Exercise Solution – Layers

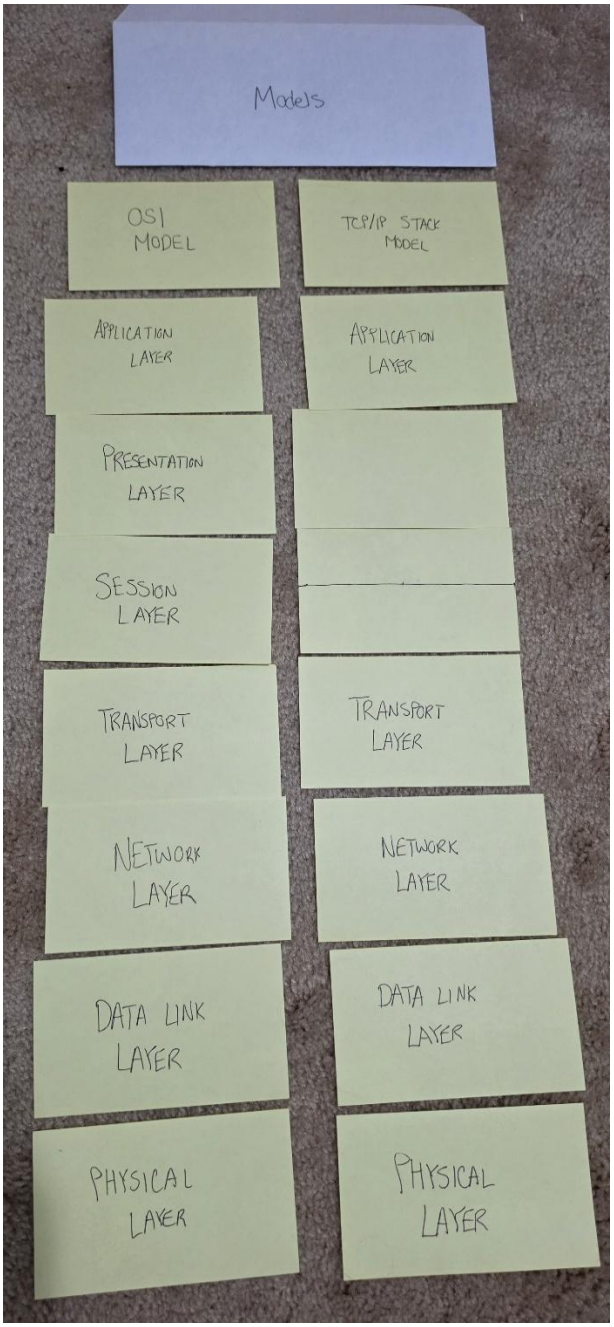

Figure 1. Card Sort Solution for Models

No, the colors of the index cards do not matter to the exercise. I used what was available. Some of my sets have mixed yellow and white cards. Yes, the TCP/IP stack should have a blank card and a card with a line through it. The blank and application layer cards are interchangeable, but everything else is fixed. The blank card and the line card often confuse students at first, but they are integral to building the models side-by-side. Once this part is complete, including taking pictures as needed for studying later, students are directed to put the OSI model back in the envelope but keep out the TCP/IP model for the next part of the exercise.

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APPENDIX C.
Card Sort Exercise Solution – Functions and Protocols

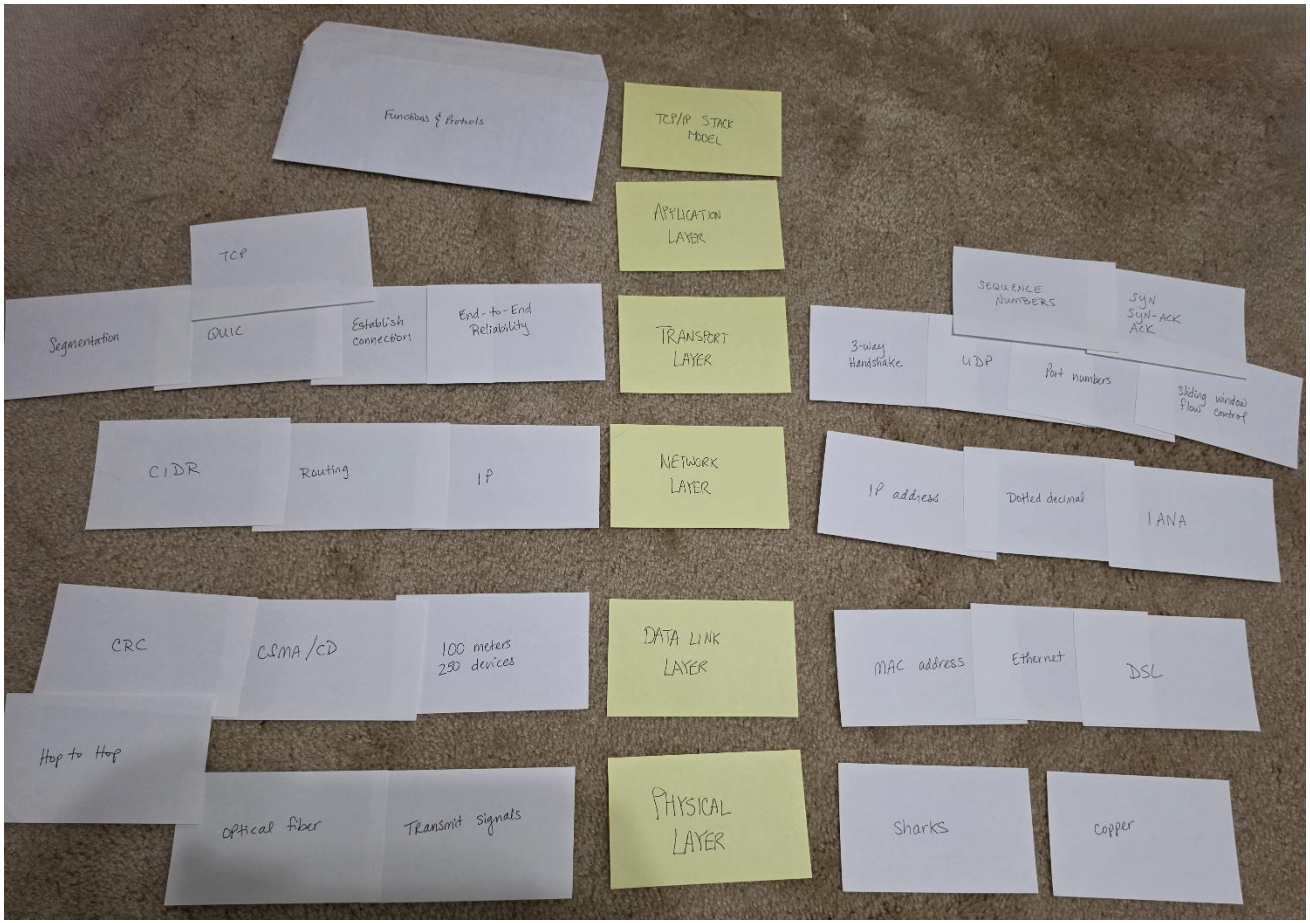

Figure 2. Card Sort Solution for Protocols

There are no functions or protocols at the Application layer, because they are not on the first exam. Hop-to-Hop, Ethernet and DSL might be put in either physical or data link layer, depending on how they are used in context. The important outcome of this exercise is for students to discuss the terms and what they mean.

Full disclosure: I used the AI tool in Windows Photos app to crop out extraneous objects in the top corners of this photo. I have not used AI for anything else in this paper.