

ELPS 811: Constructivist Learning Technology

Youngjin Lee

Spring 2019

E-mail: yjlee@ku.edu

Office Hours: Email me to make an appointment

Office: 413 JRP

Web: people.ku.edu/~yjlee

Class Hours: Thursday 4:30 - 7 PM

Class Room: 102/103 JRP

Course Description

To be effective, educational technology must be designed based on what we know about how people learn. This course explores (1) important constructivist learning theories, (2) how such learning theories can be used in designing and developing computer-based learning environments, and (3) how student learning can be assessed in those environments. This course is suitable for students who wish to learn how constructivist learning technology can change the way we teach and learn new knowledge.

Course Objectives

Upon completion of this course, students will be able to:

1. Understand how constructivism is different from other theories of learning.
2. Understand how constructivist learning theories can be used to guide the design and development of computer-based learning environments.
3. Understand different types of assessments that can be done in constructivist learning environments.

Course Policies

Correspondence

Detailed descriptions of learning activities will be posted in the LMS. Students must check the LMS regularly and submit their work to the designated place in LMS.

Attendance

Showing up is 80 percent of life – Woody Allen, [via Marshall Brickman](#)

Students are accountable for all information presented during each class session and completing in-class activities and assignments. Students should attend all meetings of their classes because active participation is frequently essential to insure maximum benefit for all members of the class.

Late Assignments

All assignments are to be submitted by the scheduled due date. Late assignments will be penalized affecting both project and course letter grade. Works may not be accepted if they are submitted one week after the due. Exceptions to this policy will only be made in extraordinary circumstances. As a general rule, you should not request an exception to this late policy.

Incompletes

A final “Incomplete” grade is not permitted except in case of prolonged, continuous, and excused absences in the latter half of the course.

Cheating and Plagiarism

Cheating is the actual or attempted practice of fraudulent or deceptive acts for the purpose of improving one’s grade or obtaining course credit; such acts also include assisting another student to do so.

Grading

Final grades will be based on the percentage of points earned toward the total possible number of points (points earned divided by points possible = percentage).

Grade	Percentage	Note
A	95% - 100%	Honors-level work, outstanding
A-	90% - 95%	High level of performance
B+	87% - 89%	Solid and above-average level of performance
B	83% - 86%	Acceptable level of performance
B-	80% - 82%	Minimally acceptable
C+	77% - 79%	Not acceptable level performance
C	73% - 76%	
C-	70% - 72%	

- 10% of your grade will be determined by your attendance/participation.
 - Students are expected to attend each scheduled class, to have read assigned readings for each class session beforehand in order to be ready to participate in the class discussion.
- 30% of your grade will be determined by various in-class activities including pop-quiz, and homework.
- 30% of your grade will be determined by midterm paper.
- 30% of your grade will be determined by final paper. See **Class Schedule** section for more details on the midterm and final papers.

Resource

KU Writing Center

This course requires the ability to write at an ILR level of 3 proficiency or above (See: <http://www.govtilr.org/Skills/ILRscale5.htm>). If you need special assistance with writing, you are encouraged to contact the writing support center at the KU Writing Center (See: <http://writing.ku.edu>). A good resource for writers is Purdue University's Online Writing Lab (OWL) website.

Class Schedule

Week 01, 01/21 - 01/25: Syllabus Day

No assigned reading

- Form a group of three people
- Review of syllabus

In-class activity: Learning statement (Due Date: 1/31 at 4:30 pm)

- Write a short statement about learning. Think about some of these questions as you write your learning statement:
 - What do you mean by learning? How would you define what learning is?
 - How do you learn best, and why?
 - What would be the role of the teacher in your description of learning?
 - How can technology be used to facilitate learning?

Week 02, 01/28 - 02/01: Behaviorism, cognitivism & constructivism (online)

Readings

1. Jonassen, D. H. (1991). Objectivism versus constructivism: Do we need a new philosophical paradigm? *Educational technology research and development*, 39(3), 5–14. (Available from <http://www2.lib.ku.edu/login?URL=http://www.jstor.org/stable/30219973>)
2. Ertmer, P. A., & Newby, T. (2013). Behaviorism, cognitivism, constructivism: Comparing critical features from an instructional design perspective. *Performance Improvement Quarterly*, 26(2), 43–71. (Available from <http://onlinelibrary.wiley.com/doi/10.1002/piq.21143/epdf>)

Homework: Reflection on your learning statement (Due 2/7 at 4:30 pm)

Week 03, 02/04 - 02/08: Cognitive load theory & cognitive theory of multimedia learning (face-to-face)

Readings

1. Sweller, J. (2009). Implications of cognitive load theory for multimedia learning. In R. E. Mayer, *The Cambridge Handbook of Multimedia Learning* (pp. 19–30). New York, NY: Cambridge University Press. (Available from https://www.cambridge.org/core/services/aop-cambridge-core/content/view/F5F9582CB12C6781FA9C61F6B459D7FC/9780511816819c2_p19-30_CBO.pdf/implications_of_cognitive_load_theory_for_multimedia_learning.pdf)
2. Mayer, R. E. (2009). Cognitive theory of multimedia learning. In R. E. Mayer, *The Cambridge Handbook of Multimedia Learning* (pp. 31–48). New York, NY: Cambridge University Press. (https://www.cambridge.org/core/services/aop-cambridge-core/content/view/A49922ACB5BC6A37D19780511816819c3_p31-48_CBO.pdf/cognitive_theory_of_multimedia_learning.pdf)

In-class activity: Three different types of cognitive load and their implications

Week 04, 02/11 - 02/15: Expert vs. novice (online)

Reading National Research Council. (2000). How experts differ from novices. In J. D. Bransford, A. L. Brown, & R. R. Cocking, *How People Learn* (pp. 31–50). Washington, D. C.: National Academies Press. Retrieved from <https://www.nap.edu/catalog/9853/how-people-learn-brain-mind-experience>

Week 05, 02/18 - 02/22: Learning and transfer (face-to-face)

Reading National Research Council. (2000). Learning and transfer. In J. D. Bransford, L. Brown, & R. R. Cocking, *How People Learn* (pp. 51–78). Washington, D. C.: National Academies Press. Retrieved from <https://www.nap.edu/catalog/9853/how-people-learn-brain-mind-experience-and-scho>

In-class activity: Implications of expert vs. novice & learning and transfer research

Week 06, 02/25 - 03/01: Constructivism & constructionism (online)

Readings

1. McLeod, S. A. (2010). Jean Piaget: <http://www.simplypsychology.org/piaget.html>
2. McLeod, S. A. (2010). Lev Vygotsky. Retrieved from <http://www.simplypsychology.org/vygotsky.html>
3. Papert, S. (2006). Teaching children thinking. *Contemporary Issues in Technology and Teacher Education*, 5(3), 353–365. Retrieved from <http://www.citejournal.org/volume-5/issue-3-05/seminal-articles/teaching-children-thinking/>
4. Harel, I. & Papert, S. (1991). Situating constructionism. In S. Papert & I. Harel., *Constructionism*. Ablex Publishing Corporation. Retrieved from <http://www.papert.org/articles/SituatingConstructionism.html>

Midterm paper (due on 3/28 at 4:30 pm) In the first half of this course, you learned about various learning theories: cognitive theory of multimedia learning, cognitive load theory, human cognitive architecture, constructivism, social constructivism, and constructionism. You will now demonstrate your learning up to this point by writing a midterm paper. For this paper, you need to select a technology tool that made a positive or negative impression on your own past learning experiences as a student (learner), not a teacher. It can be anything you have used in an educational context: a website, a movie, a CD-ROM, educational software, PowerPoint, Excel, etc. It can be constructivist/constructionist technology or not. By “a technology tool,” I mean a technology tool and the context in which it was used. Provide a brief description of this technology for those who may not be familiar with it. Then describe your recollections and impressions of this earlier technology and its impact on your learning. You should answer at least the following questions, although there are many other valid questions you can ask yourself.

- Provide some background: What was the intended use of the technology? Who was the intended audience?
- What was the intended learning goal to be supported by using the technology?
- Based on your personal experience, did the technology meet the intended goal? Why or why not?
- What were the positive or negative effects of using the technology? Were there any unintended effects? If so, what were they?
- Evaluate the technology tool in the context of the different learning theories that have been presented in this course
- What are the strengths of the technology tool, based on these learning theories?
- What are the weaknesses of the technology tool, based on these learning theories? Your midterm paper should be around 2,000-3,000 words in length.

Submit your midterm paper through this assignment page by the posted due date. Use the naming convention “Firstname_Lastname_MidtermPaper.pdf” for your paper.

Week 07, 03/04 - 03/08: Object-to-think-with (face-to-face)

Readings

1. Papert, S. A. (1993). Gears of my childhood. In *Mindstorms* (pp. 1–2). New York, NY: Basic Books. Retrieved from <https://llk.media.mit.edu/courses/readings/gears-v1.pdf>
2. Childhood object stories:
 - Cello: <https://llk.media.mit.edu/courses/readings/Turkle-EO-cello.pdf>
 - Knots: <https://llk.media.mit.edu/courses/readings/Turkle-EO-knots.pdf>
 - tars: <https://llk.media.mit.edu/courses/readings/Turkle-EO-stars.pdf>
 - Blocks: https://llk.media.mit.edu/courses/readings/FFS_Kuhn_Blocks.pdf
 - Steps: https://llk.media.mit.edu/courses/readings/FFS_Safdie_Steps.pdf
 - Coloring set: https://llk.media.mit.edu/courses/readings/FFS_Ingeber_VenusParadiseColoringSet.pdf
3. Papert, S. A. (1993). Computers and computer cultures. In *Mindstorms* (pp. 19–37). New York, NY: Basic Books. Retrieved from <https://llk.media.mit.edu/courses/readings/mindstorms-chap1.pdf>

In-class activity: Your object-to-think-with

Week 08, 03/11 - 03/15: No class (spring break)

Week 09, 03/18 - 03/22: No class

- Work on midterm paper (due on 3/28)

Week 10, 03/25 - 03/29: Computational thinking I (online)

Readings

1. National Research Council. (2010). What is computational thinking? *In Report of a Workshop on the Scope and Nature of Computational Thinking* (pp. 7–32). Washington, D. C.: National Academies Press. Retrieved from <https://www.nap.edu/catalog/12840/report-of-a-workshop-on-the-scope-and-nature-of-computational-thinking>

Week 11, 04/01 - 04/05: Computational thinking II (face-to-face)

Readings

1. Scratch tutorials (https://scratch.mit.edu/projects/editor/?tip_bar=home)
2. Brennan, K., & Resnick, M. (2012). *New frameworks for studying and assessing the development of computational thinking*. Paper presented at the AERA 2012, Vancouver, BC, Canada. Retrieved from http://web.media.mit.edu/~kbrennan/files/Brennan_Resnick_AERA2012_CT.pdf

In-class activity: Computational thinking with Scratch

Week 12, 04/08 - 04/12: Computer simulation and games I (online)

Readings

1. National Research Council. (2011). Learning with simulations and games. *In Learning Science Through Computer Games and Simulations* (pp. 25–56). Washington, D. C.: National Academies Press. Retrieved from <https://www.nap.edu/catalog/13078/learning-science-through-computer-games-and-simulations>

Week 13, 04/15 - 04/19: Computer simulation and games II (face-to-face)

Reading

1. Wilensky, U., & Reisman, K. (2006). Thinking like a wolf, a sheep, or a firefly: Learning biology through constructing and testing computational theories-An embodied modeling approach. *Cognition and Instruction*, 24 (2), 171–209. Retrieved from <https://ccl.northwestern.edu/papers/bio/long/>

In-class activity: NetLogo-based embodied modeling approach

Final paper (due on 5/12 at 11:59 pm) In this course, you learned about various constructivist learning theories, such as Piaget's constructivism, Vygotsky's social constructivism, and Papert's constructionism. You have also learned about computational thinking and computer simulations and games. In addition, you have had several opportunities to experience constructivist learning yourself through the different technology activities you completed with Scratch, NetLogo, and others. To bring together everything you have learned in this course, you will write a final paper. For your final paper, you will develop a complete lesson plan by applying what you have learned to create a learning activity centered around a technology tool that applies the theories from this class. First, you will need to choose a specific topic for your lesson plan. Keep in mind that you need to choose a topic that will lend itself well to constructivist learning technologies because your lesson plan should use constructivist learning technologies effectively. Be sure to include the following when you write your lesson plan:

- Choose a constructivist technology tool that you would like to use for the topic you have chosen.
- This can be a tool that you are familiar with or a tool that you might not be familiar with.
- Or, you can even imagine a tool that does not yet exist! If you do, be sure to explain how this imagined tool is constructivist.
- Identify specific learning activities that will be centered around the constructivist learning technology you selected.
- Describe how this learning activity and the technology tool you are using can help students learn the target knowledge in comparison to the conventional approach.
- Describe how your technology tool and learning activities implement the learning theories covered in this class.

Your final paper should be around 2,000-3,000 words in length. Submit your midterm paper through this assignment page by the posted due date. Use the naming convention Firstname_Lastname_MidtermPaper.pdf for your paper.

Week 14, 04/22 - 04/26: Computer simulation and games III (online)

Reading

1. National Research Council. (2011). The role of simulations and games in science assessment. In *Learning Science Through Computer Games and Simulations* (pp. 87–104). Washington, D. C. Retrieved from <https://www.nap.edu/catalog/13078/learning-science-through-computer-games-and-simulations>

Week 15, 04/29 - 05/03: Computer simulation and games IV (face-to-face)

No assigned reading

In-class activity: Educational game activity

- Course evaluation