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Summary of Issues Covered, M.S. Program in Learning, Design, and Technology

Spring 2022

LDTE 5010: Elements of Design

1. **Design Theory.** One central issue focused on thinking about a philosophy of design. While we discussed design theory, we did so from a philosophical and not necessarily a technical standpoint. Design theory, in the broad sense of the term, encompasses the intersections between human action and design. On a human level, design seeks to make human experience more pleasurable, easy, and effective. To this end, we considered, reflected on, and assessed the design of objects in our everyday interactions with things and in light of how they have made the conditions of life more effective, pleasurable, or easier to navigate.
2. **Gestalt Principles.** In thinking about the function or purpose of design, we explored the form or principles of design, such as color, order, balance, structure, space, texture, etc. To this end, we explored form and function through the lens of Gestalt principles of design and their relation to human perception and cognition. We did this through the study of the principles themselves (proximity, closure, similarity, common region, continuity, figure and ground, symmetry, and common fate) and how they functioned in design that we encountered in our day to day lives.
3. **The Design Thinking Process.** Design thinking is a practice of solving complex problems with creativity and the users in mind. Core elements of this practice are understanding the needs and wants of the user or audience (such as learners and teachers); finding the root cause of the problem at hand; and sketching and prototyping tangible design solutions. To this end, the design thinking process includes empathizing (learning about the audience), defining (articulating key questions), ideating (brainstorming solutions), prototyping (building representations of ideas), and testing (trying out ideas and gathering user feedback). In practice, the design thinking process is a recursive, non-linear process.
4. **Creativity.** The practice of being creative and developing creative ideas and artifacts is also a practice of dealing with ambiguity and uncertainty while remaining flexible and adaptable to change. Developing a creative mindset includes a willingness to explore imperfect ideas and impartial answers as this act allows deep analysis and concept internalization to occur, which in turn lays the foundation for creating novel ideas and solutions. This is particularly important for the ideation phase of the design thinking process.
5. **Developing a 'Designerly' Mindset.** From an overarching perspective, design and becoming an effective designer encompasses more than applying design principles and processes. It's about

developing a mindset. A 'designerly' mindset. While such a mindset can be practiced in several ways, some characteristics and dispositions include (1) focusing on people and designing for people; (2) seeking to be cross-disciplinary and collaborative; (3) thinking in an holistic and integrative manner by analyzing the big picture; (4) being flexible and comfortable with ambiguity;(5) practicing and developing multimodal communication skills; and (6) maintaining a growth mindset and being comfortable with change.

LDTE 5100: Innovative Pedagogy

1. **Defining Terms**. A continued effort to developing and refining definitions of key concepts related to innovative pedagogy is important to develop a personalized understanding of how one's practice enacts these key components, which are abstract and subjective in nature. To this end, we worked towards developing definitions of several key concepts relative to innovative pedagogy: Innovation, Creativity, Learning, Learning Environment, Pedagogy, Transferable Learning, and Culture.
2. **SAMR Framework.** The SAMR model, invented by Dr. Puentedura, offers a framework for integrating technology to enhance learning. SAMR stands for Substitution, Augmentation, Modification, and Redefinition, and these terms categorize the purpose of digital education tools. Is the purpose of the tech tool to substitute the in-person activity? Or add on to it (augment)? Or does the tech tool function to significantly modify an activity? Or perhaps redefine it entirely? Ideally, technology should be able to modify or redefine learning more so than simply substitute or augment what could be done without it, even though this is sometimes necessary in certain learning contexts.
3. **TPACK Framework.** TPACK is a model for technology integration that stands for Technological, Pedological, Content Knowledge. It helps practitioners explore the intersections of these key components to develop and assess programs. Students applied this framework to design and revise a lesson plan.
4. **Change Theory.** Kurt Lewin's 3-step model of social change illustrates the process of how change occurs, whether this change is relative to an institution's culture or a significant change in a learner's perspective. The three steps are described as the "unfreezing" stage (when old knowledge and beliefs are contested), the "change" stage (when new knowledge and beliefs are processed), and the "refreezing" stage (when a new perception is formed and signified by an action). In a class project, I explored how Lewin's 3-step model for change could be applied to online course design and to integrating technologies to deliberately address educational inequities.
5. **Comparative Pedagogy.** This course offered an introduction to several pedagogies, such as crossover learning, incidental learning, enriched realities, and play-based learning. The purpose of this overview was for students to compare, contrast, combine, and ultimately apply select pedagogies to teaching and learning. Some questions explored were: How do you bring together these pedagogical ideas with the realities of helping someone learn? How could the pedagogies

work for you? In the end, students identified their preferred mix of pedagogies that best represented their approach to teaching and learning. For me it was Crossover Learning, Playful Learning, and Making Thinking Visible.

Summer 2022

LDTE 5120: Managing Design & Technology

1. **Project Management Goals.** One issue emphasized was the complexity of managing a project within an institution, especially with regards to the ideal goals that a project manager should strive for. In an ideal world, a project would achieve the goals it set out to complete, producing all deliverables and meeting all stakeholder expectations without compromising on functional and performance quality. It would also be completed according to an approved schedule and budget while creating a positive experience that team members would want to produce. (For example, certain team members would not have to carry the burden of completing the bulk of tasks; everyone would work harmoniously.) While this description comprises the ideal of successfully managing a project, it is rare that the course of a project follows this trajectory without notable issues arising, such as competing stakeholder needs, budget constraints, and limited resources.
2. **Defining A Project.** There are several issues to consider when planning a project, and the level of planning can condition the success of implementation. To set up a project for success, it is particularly important to define the problem that will be addressed and make sure stakeholders are in agreement with the project definition even before the actual planning of project implementation occurs. This task requires the project manager to communicate with team members and stakeholders in the creation of a project definition document that lays out several factors everyone should be aligned with: the purpose of the project; its goals and objectives; the success criteria (i.e. what signifies successful completion); the context of the project; any dependencies that could affect the success of the project; the specifications that are considered to be in-scope of the project as well as those considered to be out-of-scope; the assumptions on the work being performed as well as any constraints; any risks that could negatively affect project success; a list of stakeholders and their roles in the project; and the recommended approach to completing the project. This is not an exhaustive list of elements to consider and document in collaboration with stakeholders but represents the fundamental items that all projects should consider. Other aspects of project preparation that can serve to define a project are detailing any alternative approaches to completing the project; anticipating issues resulting from organizational changes that could arise; any policies or standards that apply to the project as well as preliminary estimates with regards to costs, resources, and schedules.
3. **Flexibility In Planning, Implementing, And Controlling A Project.** While much detail could be laid out with regards to taking a project from its beginning to end, the key point to retain is that planning, implementing, and controlling a project are recursive elements framed by simple

strategies that initiate and close a project. Building a project plan; developing a work structure, schedule, and budget; and managing project risks, issues, and deliverables as well as general team performance are just some of the elements that a project manager will need to go back and forth with. Being flexible, developing creative solutions to arising issues—some of which may affect the trajectory of the project goal—and anticipating change are all important and integral skills.

4. **Profiles In Learning, Design, And Technology.** One key issue covered in the class was the diverse contexts that instructional designers work in. To this end, the class explored case studies in both academic and military contexts and also explored employment announcements individually for the purpose of categorizing the skills needed to perform in the instructional design contexts of personal interest. While education and work experience are common requirements defined in announcements, the skillsets that arose from this investigation included: experience with workplace and third-party educational technologies; experience with educational design frameworks and techniques; the ability to develop creative solutions to developing problems; and effective communication or the ability to lead, manage, and collaborate with multiple stakeholders.
5. **Learning From Projects:** One practice emphasized was not only the "when and how" of developing and implementing a project, but the development of a reflective practice of assessing the experience of seeing a project through to its end. This practice is important to developing the critical thinking skills that project management requires, such as by evaluating when and why problems arose, as well as understanding when and why successes occurred. As a class, we initiated this practice by examining case studies, and then moved on to consider our own workplace projects and reflect on the conditions of relative success and the obstacles that occurred along the way. I was able to assess my experience working on a team to integrate outcome assessment technology at our campus and discovered that one of the major obstacles we face (which delayed successful completion) was a lack of functional knowledge of the software itself. From this experience, I learned that this pitfall could potentially be avoided with future educational technology integration projects by organizing training workshops for managerial stakeholders as a condition of purchasing the product.

Fall 2022

LDTE 5000: Theoretical Foundations in Learning, Design, & Technology

1. **Transformational Learning.** As we explored several learning theories throughout the course, we were asked to reflect on those that informed our practice of teaching and learning. To this end, I viewed transformational learning theory as the guiding backdrop to my practice of teaching since it emphasizes identity formation, habits of mind, and a transformation in our self-perception and worldview. In practice, transformational learning highlights social justice, critical self-reflection, collaboration, and inclusive dialogue and discourse.

2. **Brain-Based Learning.** Brain-based learning theory explores the intersections between brain science and cognitive learning theory. What I like about it is that it can provide simple and effective techniques for the teacher's toolkit. For example, brain-based research reveals that students pay attention more when new objects enter the room, no matter how simple they are. Research shows that simply holding a new object in your hand will increase student attention, and that attention decreases when students are exposed to routine objects on a daily basis. Another interesting reveal from brain-based research is that music with 60 to 70 beats per minute (mirroring the human heart) is most conducive to learning. This is just another example of the simple but profoundly useful insights brain-based learning theory offers the practitioner for making a learning environment more focused and effective.
3. **Social-Cognitive Theory.** Social cognitive theory emphasizes the role of peer interaction and collaboration in learning. There are several learning theories that share this central tenet, such "socio-cultural learning theory" and "situated cognition/contextual learning theory." These theories emphasize the value of the social context of learning, the necessity of collaboration, and the belief that learning takes place primarily through engagement in contextualized activities as opposed to receiving information delivered by an instructor. This idea also speaks to the primary role of the teacher as a supportive facilitator rather than an expert who is the "holder of all knowledge."
4. **The Role Of The Teacher.** Exploring my personal philosophy with regards to the role as the teacher was a reoccurring theme in this class. To this end, I leveraged some of the learning theories we explored to develop my position on the teacher's primary role as a support resource for learners. That is, a teacher's interaction with students is not to lecture or point out errors in student work, but to provide resources and insight that will help students develop ideas and intelligent strategies for learning. My perspective on the role of the teacher was inspired in part by Hattie and Donahue's "A model of learning: Optimizing the effectiveness of learning strategies" (2018). Their model acknowledges that some lecture is valuable to communicate necessary context but emphasizes that the main goal of learning is to acquire the skill of knowing how and when to employ strategies for surface learning, deep learning, and transfer learning (applying knowledge to other contexts). Conceiving of the learning process as a negotiation of strategies and the cultivation of the skill to know when and how to apply strategies appropriate to specific contexts and purposes is fundamental to the idea that a teacher's primary role is to serve as a support resource for learners.
5. **The Role Of Critical Reflection In Teaching And Learning.** Metacognitive reflection is a key practice in teaching and learning, both in terms of exploratory thought conducted after a learning activity and between steps of a larger project as well as in terms of "reflection in action" whereby learners reflect and adjust their strategies in the act of doing. Social metacognition, whereby learner reflection is the center of a collaborative activity, is a both a valuable and necessary form of reflection for learning. Teaching is also a reflective practice, and to this end, metacognitive reflection is a key practice for teachers as well. Teachers must continuously consider the design and implementation of lessons and activities as well as

reassess their approach to teaching and learning. Reflection is a key practice that should be given necessary space in both teaching and learning.

LDTE 5020: Technology & The Mind

1. **Philosophy Of Technology.** Cultivating an awareness of the philosophical foundations of technology and how it intersects with cognition and learning offers a fundamental backdrop to thinking critically in the field. As such, students explored the historical perspectives of the philosophy of technology and considered technology in context with behavioral and cognitive outcomes. For instance, consider the behavioral habits conditioned by smartphones in our day-to-day lives; also, consider the cognitive work that technology now performs for us, often through quick internet searches on our phone, which enables us to focus our cognitive efforts on other tasks. Our interactions with technology conditions our potential more so than the features of the technology itself.
2. **Evaluating Human-Technology Interactions.** This issue focuses on the question of how to interact with technologies for different outcomes and purposes. The interplay of technology and cognition can be viewed or assessed through a systematic lens or analytical lens. The systematic approach views the interplay of human-technology performing as a whole system, while the analytical approach focuses on the cognitive processes that the individual applies or exerts. Negotiating these frameworks and the contexts in which one applies them is important to evaluating learning outcomes and cognitive effects of human-technology interactions.
3. **Teacher Beliefs & Technology Integration.** One issue with technology integration centers on just how much the values and beliefs of the teacher condition the role of technology in the classroom. Often, a teacher's attitude and disposition toward learning technologies can be a benefit or barrier to effective technology integration. As such, the TPACK model (discussed above under "Innovative Pedagogy") offers an effective framework for teachers to evaluate technology integration, allowing them to examine their own dispositions towards learning and technology in the process.
4. **Digital Literacy and Digital Learning.** One of the biggest take-aways from this class is the realization that being fluent in using technology does not necessarily mean that one knows how to use technology for learning. As such, one of the issues with technology integration is the assumption that students, those often referred to as "digital natives," will be able to learn with technology simply because they grew up using technology. This calls attention to the importance of teaching students how to learn with technology and not assume that knowing how to navigate technology is knowing how to learn with technology.
5. **Technology Integration, Proficiency, and Emotion.** Another issue raised by technology integration is teacher confidence. The extent to which teachers are proficient enough or feel comfortable using the technology is a significant issue in technology integration. Simply using technology does not mean it is integrated. Teachers can have computers or smartboards in the class without necessarily integrating them into the class. That is, technology integration means

that technology is a part of learning activities in such a way that it enhances the learning experience to the extent that it would be fundamentally different (and less effective) if conducted without the technology.

LDTE 5210: Learning Experience Design

1. **Instructional Design Versus Learning Experience Design.** One important issue explored at the outset of this course was the difference between instructional design (ID) and learning experience design (LXD), as these terms have been used interchangeably even though they are distinct in meaning. For example, one of the distinctions between these terms is how the design framework is conceived. ID typically employs a linear framework and LXD uses a non-linear framework. Also, ID tends to focus on outcomes and the ease of use while LXD focuses on the learning experience and its usefulness to learners.
2. **ID and LXD models.** Perhaps the most popular model of ID/LXD models is called ADDIE, which stands for analyze, design, develop, implement, and evaluate. Designers analyze contexts and learner needs, design specifications for learning, develop course management materials, implement instruction, and evaluate the results of the design process. The learning experience design framework emphasizes the non-linearity and recursive nature of the design process, hinging its framework on the more general steps of planning, creating, and refining while emphasizing the complexity and reiteration of the steps.
3. **Front-End Analysis For Learning Experience Design.** The planning step in the learning experience design process cannot be emphasized enough. Much can be overlooked in the early stages of a project that could compromise the effectiveness of the product. Some of the many things a designer can and should do in front-end analysis are identifing and defining a problem, considering resources needed to solve it, negotiating possible causes and evidence, determining solutions and alternative solutions, and identifying constraints and goals.
4. **Defining Learning Experiences.** The ability to conceptualize and develop a terminology with which to describe learning experiences can help practitioners with implementing learning experiences. As such, it's important to develop an awareness of terminologies and other tools of description and definition. For example, User-Centered Design, Learner-Centered Design, User Experience, Learner Experience, User Experience Design, Learning Design, and Learning Experience Design are terms sometimes used interchangeably and definitions of each can differ based on where and when they are encountered. But each term suggests distinct though interwoven features. Being able to define your particular approach to design and learning and developing a vocabulary to describe it clearly is important to the effectiveness of the design process.
5. **Creativity In The Design Process.** An often understated skill that conditions our design process is creativity. It conditions our ability to create memorable learning experiences. While often testing our tolerance for uncertainty and open-mindedness, letting creative thinking guide our

design more so than targeted outcomes can be the difference between and ordinary learning experience and a novel one.

LDTE 5220: Critical Praxis in Education

1. **Critical Digital Pedagogy.** Critical digital pedagogy refers to critical pedagogy in a digital context. Critical pedagogy is defined as a reflective practice in which teachers leverage instructional practices to support social change and give students voice. It is rooted in educational liberation movements, such as that promoted by the work of Paulo Freire, and seeks to empower marginalized voices and challenge the status quo. Critical digital pedagogy places this same concept in a digital context in which practitioners leverage digital communication tools to reimagine collaboration and community across political and cultural boundaries. Like critical pedagogy, it emphasizes questioning the status quo and creating a space in which voices and cultural ideologies compliment and integrate with one another rather than compete for representation.
2. **Banking Model Of Education Versus Problem-Posing Education.** One of the more significant issues that arose from our discussion on Paulo Freire's work was the difference between the banking and problem-posing models of education. In a nutshell, the banking model upholds power structures in the class by approaching education with the ideology that a teacher imparts knowledge to students. Problem-posing education, on the other hand, breaks down power structures by approaching education through the lens of collaboration in which both teacher and students work together in the educational process.
3. **Instructional Design (By Cathy Moore).** When we studied instructional design strategies from the works of Cathy Moore, one of the more central design-focused ideas that stood out was to forefront learning by activity. "Learning by doing" is a phrase that comes to mind that encompasses the ideological framework of Moore's approach to instructional design. Content, Moore argues, should only be added as support information to advance the process of completing the activity.
4. **Third Space Theory & Mobile Learning.** In one module for the course, students were given a number of articles and asked to choose one to read and discuss with the class. The one that I chose, "Mobile assisted third space (MATS) in the margins" by Rebecca Kelly (2020), introduced me to a theory that has since influenced my thought on instructional practices and digital contexts. Third Space Theory, which was first introduced by Homi Bhabha in 1994, emphasizes decentering the learning space to highlight what Bhabha calls "cultural hybridity," or a space in which the culture of academia and those of student communities are given equal and complimentary value. Kelly's article describes how the concepts inherent in Third Space Theory have the potential to be actualized through mobile learning. Mobile learning itself destabilizes traditional notions of how and when learning occurs, creates spaces that are formal and informal, and widens capacity for collaboration and contexts.

5. **Digital Stories.** As part of my "action project" for the class, I researched how to leverage "digital stories" to create community and promote creativity in the digital classroom. There are different approaches to integrating (and defining) digital stories into education. The University of Houston offers a variety of resources to integrate digital story assignments into the classroom, which they define much like video essays, or polished stories communicated through a narrated video that presents a series of images to tell a story. Saint Mary Washington University takes a different approach, offering a full course on digital storytelling (DS106) and defining digital storytelling very broadly as any representation of creativity produced or enhanced with digital tools.

Spring 2023

EDRE 5530: Introduction to Research

1. **Quantitative Research.** Quantitative research comprises research that relies on numerical data, functions under the assumption of objective reality, and focuses on hypothesis and theory testing. The goal of quantitative research is to discover patterns of behavior or thought that validate or make plausible generalizations to a larger population or contexts. As such, careful attention to evaluating inferences is done in four main areas: (1) internal or causation validity; (2) external validity, or the extent to which generalization can be inferred from study results; (3) construct validity, or the extent to which constructs are accurately measured; and (4) statistical conclusion validity, which confirms that a relationship exists between the variables in the population of focus and measures the strength of that relationship.
2. **Qualitative and Mixed Research.** Qualitative research is the most common type of educational research. It focuses on the collection and analysis of nonnumerical data and usually explores subjective experiences and open-ended research questions. The process of conducting qualitative research is recursive and involves crafting research questions, designing the study, collecting and analyzing data, generating and validating findings, and writing the research report itself. Approaches to qualitative studies can take the form of narrative inquiry, case study research, phenomenology, ethnography, and grounded theory. When both approaches are necessary to explore research questions, researchers should follow a pragmatic approach by using both methods or "mixed research." One guiding principal for this approach is to leverage the strengths of one method in order to compensate for or offset the limits of the other.
3. **Experimental Research.** Experimental research allows the researcher to observe a particular phenomenon in a controlled setting, whether conducted in a real-life setting (field experiment), in a laboratory, or over the internet. Examples of strong experimental research designs are pretest-posttest control-group design, posttest-only control-group design, factorial design, and repeated-measures design. It is important to utilize random assignment (assigning conditions based on chance) when possible as this will maximize control for confounding variables. When this is not possible, researchers can conduct quasi-experimental research. Some design models

are nonequivalent comparison-group design, interrupted time-series design, and regression-discontinuity design. For single-case experimental research, researchers can use ABA or ABAB design, multiple-baseline design, or changing-criterion design. All in all, each design offers methods to control for confounding variables based on the particular conditions of the study.

4. **Constructing Questionnaires.** Questionnaires are a common means of data collection in educational research in which a series of questions are answered by the research participants. In constructing a questionnaire, it is important that the items match the research objectives, reflect an empathetic understanding of the research participants, are articulated in language appropriate to the culture and reading level of the participants, are clear and relatively brief, and do not include any questions that would cause confusion (by using double-negatives, for instance) or that suggest bias (as would leading questions). In addition, the researcher should carefully consider when open-ended and closed-ended questions are appropriate or effective.
5. **Descriptive And Inferential Statistics.** Descriptive statistics function to summarize a dataset. This begins by calculating some basic numbers, such as the mean, median, and mode as well as the range, variance, and standard deviation. Researchers can also calculate the correlation coefficient and conduct a regression analysis when examining relationships among variables. How to communicate the features of the data is of central focus to descriptive statistics. Some strategies include constructing a frequency distribution, utilizing graphic representations such as bar graphs, histograms, line graphs, and scatterplots. While descriptive statistics aim to describe the data, inferential statistics aims to look at the data and draw conclusions or make inferences from it about the relative population. Some strategies to measure the probability of inferences to the population are constructing sampling distributions, running a point estimation or constructing a confidence interval for interval estimation, and conducting a logic of significance test for hypothesis testing.

LDTE 5110: Visual Design & Media

1. **Multiliteracies.** Multiliteracies highlights linguistic diversity and multimodal forms of expression and representation. It acknowledges that literacy is both multi-contextual and multi-modal. Pedagogy of multiliteracies centers on four dimensions: (1) experiencing (situated practice), (2) conceptualizing (overt instruction), (3) analyzing (critical framing), and (4) applying (transformed practice). One important aspect of multiliteracies for today's learners is digital literacy, or the ability to leverage critical thinking skills to locate, evaluate, and communicate diverse modes of information in a digital context.
2. **Visual Communication.** Visual communications is a creative process that begins with a message and leverages technology and the visual arts to communicate that message. Logos, symbols, graphs, interactive content, and motion graphics are some examples. The aesthetic use of space, the emotions evoked through color, and the values suggested by shapes comprise some of the design choice of visual modes of communicating. In class, our discussion turned to school mascots and logos, and we analyzed what these images communicated from a visual standpoint.

3. **Information Design.** Information design emerged from the fields of graphic design, education, architecture, and engineering. Information designers negotiate structure, clarity, emphasis, and unity as they leverage technology tools and process and stakeholder knowledge to coordinate design of instructional materials. One of the most practical products of information design is infography. Dunlap and Lowenthal's situational qualities--immediacy, malleability, compellingness, resonance, and coherence—can be used to evaluate the effectiveness of information delivery.
4. **Design Systems.** Evaluating and exploring design systems was one of the main focal points of the class. A design system begins with a "design vision." Articulating the values that go beyond surface features such as typeface and color is the first step. There is also the functional aspect of design systems, that which communicates design choices that adhere to communicated values of the larger project or institution. To this extent, the class evaluated branding guides from various colleges to assess both the effectiveness of communicating the values of the brand as well as the functionality and user-friendliness of the branding guide itself.
5. **Multimodal Design.** At a basic level, multimodal design refers to works that use more than words to communicate, such as video, illustrations, and photographs. The modes of communication that multimodal design draws from can be categorized as visual, audio, gestural, spatial, and linguistic. Designing learning experiences by using multimodal design allows learners to process information in diverse ways and is an integral practice of universal design.

LDTE 5200: Play, Make, Learn!

1. **Play and Creativity.** The theory and pedagogy of play and the central role of creativity in play-based learning offered foundational context to this course. While play theory is grounded in observations in how children learn, its focus on creativity and creating things has informed its application to adult learning.
2. **Constructionist Learning.** Constructionism focuses on learning as integral to the process of constructing meaningful products or objects. Play and creativity are central to this approach to learning, as is Deep Learning and Transformational Learning, since both focus on higher order skills (evaluating, creating) and on authentic, learner-driven products.
3. **Makerspaces.** A makerspace is a type of constructionist learning space in which learners are equipped with various tools with which to explore and create. Makerspaces can be created for specific groups and contexts, from small children to working professionals, and they can be utilized to focus on various pursuits such as design, craftmanship, digital products, photography, art, and humanities-based projects.
4. **Microworlds.** Microworlds refers to a digital makerspace in which learners can explore and create within their own "microworld." Online games such as Minecraft offer a version of a microworld in which users select a basic landscape to build on and create their own digital world. Mathematics professor Seymour Papert (1928-2016) is often credited with the microworld concept with his development of a computer language for elementary age learners

called Logo in the early 1980s. Since then, the microworld concept has been adapted for use to adult learners and even non STEM related subjects. Duke University, for example, runs a Microworlds Lab that focuses on humanities-based research and storytelling.

5. **Virtual and Augmented Reality.** Integrating virtual reality (VR) into learning spaces has become more and more common as educational technology develops, though it still presents issues with cost, access, and equity. VR makes digital spaces interactive, immersing learners in an experience in which they can explore and manipulate digital objects. Augmented reality (AR) can be seen as a little cousin to VR, still providing learners with digital interactivity, though without the full immersive experience. VR has most often been used for STEM classes and skills training courses, but other forms of VR are being explored in education as well, such as virtual field trips in which students can explore geographical locations and cultures or visit museums on the other side of the world.