Theories to Influence the Future of Learning Design and Technology

2022 AECT RTD Theory Spotlight Competition

Bohdana Allman, Heather Leary, & Royce Kimmons

Table of Contents

Introduction
Bohdana Allman & Heather Leary
1

Examining the Intersection Between Instructional Design Decision-Making and Problem-Solving of Ill-Structured Problems through Bounded Rationality
Jill E. Stefaniak
3

Improving the Design of Learning Interaction
Victoria Abramenka-Lachheb
9

Designing for Productive Disciplinary Engagement and Responsive Assessment with Situated Cognition and Expansive Framing
Daniel Hickey
21

The Theory of Learning in Micro
Irene A. Bal, Mohammad Shams Ud Duha, Okan Arslan, Jessica Collier, Paula Marcelle, Annetta Dolowitz, Jamie Bernhardt, Meg Swanson, & Monalisa Dash
41

Understanding Empathy in Instructional Design
Hengtao Tang & Susan Porter-Voss
59

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Introduction

Bohdana Allman & Heather Leary

In 2020, *Educational Technology Research and Development* published a special issue titled "The Role of Theory in Learning Design and Technology Research and Practice" (Volume 68, Issue 2). The guest editors began the issue by writing:

> *The field of learning design and technology... aims to accomplish both research and practical goals. In short, our discipline exists equally in both the worlds of design and practice, and in research and scholarship. Undergirding and driving our work in both of these areas is good theory. Solid theoretical foundations about learning, teaching, design, and technology separate instructional designers from website developers, teachers from presenters, and academics from commentators (West et al., 2020, p. 593).*

The importance of theory in Learning Design and Technology (LDT) research is to go beyond identifying variables and questions by providing context, explanation, and critique to those variables and questions (see Whetten, 1989). Furthermore, theory is then useful to the extent that it can lead to an impact on the world (West et al., 2020). Although essential for LDT research, developing and applying theories is not easy. Warr and colleagues (2020) argued that two LDT factors make theorizing especially difficult. First, the work of LDT is complex and uncertain. Second, theory and practice must be closely connected in LDT to make claims and provide practical direction for design.

With these constraints in mind, the Research and Theory Division hosted and organized the second annual *Theory Spotlight Competition* at the 2022 annual convention of the Association for Educational Communications and Technology (AECT). The focus of the competition was to answer the question:

> *What theories should LDT researchers consider to provide context, explanation, and critique to the field?*

After a peer review of the initial proposals, five papers were selected. Authors were invited to virtually present a short video at the AECT convention. A panel of judges, Dr. Tutaleni Asino, Dr. Stephanie Moore, and Dr. Tom Reeves, reviewed and evaluated presentations on their quality (Judge Rankings). The AECT community was also invited to watch and vote for their favorite proposal (People's Choice Award). The five final papers are as follows:

1. *Examining the Intersection Between Instructional Design Decision-Making and Problem-Solving of Ill-Structured Problems Through Bounded Rationality* by Jill Stefaniak
2. *Improving the Design of Learning Interaction: A Designerly Theoretical Approach* by Victoria Abramenka-Lachheb
3. *Designing for Productive Disciplinary Engagement and Responsive Assessment with Situated Cognition and Expansive Framing* by Daniel T. Hickey
4. *The Theory of Learning in Micro: Context & Explanation* by Irene A. Bal, Mohammad Shams Ud Duha, Okan Arslan, Jessica Collier, Paula Marcelle, Annette Dolowitz, Jamie Bernhardt, Megan Swanson, Monalisa Dash
5. *Understanding Empathy in Instructional Design* by Hengtao Tang

The papers in this volume spotlight various LDT theories and frameworks useful in both design practice and design research. Each chapter presents the authors' proposed theory and examples of how it can be applied in practice. Recorded presentations from the competition are also available for your consideration with each paper.

We invite all LDT practitioners and researchers to share theories they find particularly valuable in their work in the annual RTD Theory Spotlight Competition in the coming years!

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Examining the Intersection Between Instructional Design Decision-Making and Problem-Solving of Ill-Structured Problems through Bounded Rationality

Jill E. Stefaniak

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Instructional Design | Decision-making | Ill-Structured Problem-Solving | Bounded Rationality

The theory of bounded rationality suggests that individuals engage in solving problems by making decisions by relying on their own cognitive abilities and limitations, information available to them at the time of deciding, and time constraints associated with making a decision. In this paper, I will argue that bounded rationality provides a necessary theoretical construct to further examine the intersection between decision-making and problem-solving of ill-structured problems in the field of learning, design, and technology.

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The process of decision-making requires an individual to make "a commitment to a course of action that is intended to yield result that are satisfying for specific individuals" (Yates, 2003, p. 24). To make a choice that meets optimization of a situation, individuals must gather information, identify possible solutions, weigh the advantages and disadvantages of each possibility, and move forward with a resolution (Skyttner, 2001). Decisions can be classified as rational or dynamic. Rational decisions typically allow for more time for individuals to identify problems, establish criteria, search for solutions, consider advantages and disadvantages, generate alternatives, and arrive at a solution (Klein, 2008). Dynamic decisions are often associated with time constraints, requiring an individual to make decisions quickly and with information available to them at a given time (Jonassen, 2010; Klein, 1998).

Instructional designers often find themselves engaging in designing solutions for ill-structured problems. These problems vary in structure, complexity, dynamicity, and abstractness (Jonassen, 2010). Ill-structured problems are dynamic in that the situation and its associated contextual factors are not static; they change over time (Jonassen, 1997, 2008). Ill-structured problems are often complex and present several issues that can be addressed by a variety of different solutions. Complex problems that are time-sensitive warrant dynamic decision-making where instructional designers need to make effective decisions efficiently.

The theory of bounded rationality was first introduced by Herbert Simon in 1955 as an alternative method to mathematical and economic modelling of decision-making. During this time, the mathematical and economic models that were used to guide decisions in economics and political science assumed that all individuals were rational agents engaging in decision-making to maximize utility (Simon, 1955, 1957). A fundamental limitation to the pre-existing models is that they assumed perfect rationality. Simon argued that human beings are unable to approach decision-making practices with perfect rationality; rather, they operate within a bounded rationality.

In this paper, I will argue that Simon's (1955) bounded rationality provides a necessary theoretical construct to further examine the intersection between decision-making and problem-solving of ill-structured problems in the field of learning, design, and technology. I will provide examples of how the theory of bounded rationality can be applied by researchers in the field. Lastly, I will advocate for how bounded rationality, as a theoretical lens, can help forward the vision and mission of AECT.

Bounded rationality suggests that individuals engage in solving problems by making decisions relying on their own cognitive abilities and limitations, information available to them at the time of deciding, and time constraints associated with making a decision (Simon, 1955, 1969). Bounded rationality, a rationality that is consistent with our knowledge of actual human choice behavior, assumes that the decision maker must search for alternatives, has egregiously incomplete and innocent knowledge about the consequences of actions, and chooses actions that are expected to be satisfactory" (Simon, 1997, p. 17).

The theory of bounded rationality is grounded in three premises:

> *1. Human decisions should not be assumed a priori to follow logical, statistical or any other formal model;*
>
> *2. There are three factors to take into account in decision making: the type of task, the characteristics of the environment, and the distinct features of the cognitive system that make the decision;*
>
> *3. Only in conjunction with the collection of empirical data should formal computational models of decision-making processes be developed, and their predictions should be compared with human behavior.*
>
> (Campitelli & Gobet, 2010, p. 355).

Ill-structured problems prevalent in instructional design include, but are not limited to, addressing the existence of social inequities when designing instruction; designing within budgetary and time constraints to meet project deadlines, fostering interaction and engagement amongst learners in different instructional settings, and promoting inclusive design that makes learning accessible, affordable, and sustainable.

Scholars have recognized that learning, design, and technology projects are complex and ill-structured, often requiring instructional designers and researchers to engage in problem-solving and decision-making activities amidst ambiguity and uncertainty (Jonassen, 2012; Warr et al., 2020). Instructional designers engage in design conjecture to make decisions based on constrained information (Murty, 2010; Stefaniak et al., 2018; Stefaniak et al., 2022).

The premises of bounded rationality can support scholars in the field of learning, design, and technology by helping them to establish parameters around their design space in order to engage in dynamic decision-making practices (Stefaniak & Xu, 2020a; Stefaniak et al., 2021). By establishing parameters to frame design space, instructional designers can explore solutions that meet particular criteria (Dorst, 2019).

Proponents of bounded rationality recognize this as a viable construct because it recognizes and accounts for the imperfections of human decisions. The argument that human decisions should not be assumed a priori to follow a model contributes to the growing criticism in our field that that there are significant limitations to our current instructional design models (Gibbons, 2014; Moore, 2021; Stefaniak & Xu, 2020b).

Current instructional design models fail to address the systemic implications of design decisions (Kowch 2019; Nelson, 2020; Stefaniak & Xu, 2020b). Instructional design models are limiting in that they do not provide the necessary structure to address the dynamicity present in most design situations. If the goals of instructional design are to design solutions that are effective, efficient, and provide sustainable mean to support learning, instructional design scholars must attend to the systemic implications of their design decisions.

Approaching instructional design through bounded rationality empowers instructional designers to accept the realities of situated contexts associated with their designs, establish parameters, and give themselves permission to focus on satisficing design problems rather than seeking perfection. It provides a mechanism to support dynamic decision-making to identify approach solutions to satisfy ill-structured problems.

Recognizing bounded rationality as a theory relevant to the field of learning, design, and technology will further support AECT's vision to be the premier international organization in educational technology that others refer to for research and best practices. This theory can be leveraged to assist researchers and scholars with realistically considering the

systemic implications of their scholarly activities. It enables them to establish parameters around their design space and consider contextual factors and stakeholders that will significantly influence their project outcomes.

Designing instructional interventions within a bounded rationality also helps instructional designers create viable and sustainable solutions that are an accurate and realistic reflection of situated contexts at any given time. By prioritizing this theory over others, scholarly organizations such as AECT can cultivate the next generation of instructional designers by providing them with guidance on how designing within bounded rationality can further support scholars who engage in decision-making and problem-solving activities for ill-structured problems in the field. It provides a mechanism to understand the realities that instructional design scholars and professionals face on a regular basis when engaging in ill-defined design projects.

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Improving the Design of Learning Interaction

A Designerly Theoretical Approach

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Human-computer Interaction | Learning Design | Interactions | Interaction Design

Learning design and technology (LTD) researchers can use the Window of Interactions framework to provide context, explanation, and critique to the field. This framework provides the opportunity to analyze the technological characteristics of different types of interactive objects, including learning objects and learning environments, while keeping in mind pedagogical affordances. Using the framework enables LDT researchers to establish a link between interactive features of learning objects and learning goals and find better ways to design interactive learning experiences.

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Introduction and Description of the Theory

Learning interactions are an evolving aspect in the Learning Design and Technology (LDT) field due to the constant evolution of technological means. How learners interact with learning objects nowadays is different from a few decades ago, and it is safe to say it will be different in the future. As we live in a world surrounded by interactions and things that keep us busy (Janlert & Stolterman, 2017), change in the design and experiences of interaction is constant. Based on this premise, the *Window of Interaction* is both a theoretical and analytical framework proposed by Janlert & Stolterman (2017). This framework includes eight dimensions, which allows for analysis (and potentially an evaluation) of how different technology artifacts facilitate: (a) user's agency; (b) independence; (c) receptivity; (d) predictability; (e) freedom of action; (f) pace/time; (g) attention demand; and (h) awareness level. Each of these dimensions of interaction can be used as a descriptive lens to rate designed interaction from low to high.

This framework is designerly (Stolterman et al., 2009) and originates from the area of broader design theory. It does not strictly prescribe how to design interactions, as it describes qualities that can be used to analyze and evaluate interactions in diverse contexts. Janlert and Stolterman (2017) argue that the ways we interact with new technologies have also changed because we do not need to give certain commands to get a particular artifact or system to work. Instead, we can now manipulate or operate artifacts in an expressive-impressive way (e.g., using our voice or body movement to interact with technologies). The expressive-impressive style of interactions is what distinguishes new and emerging types of interactions. As such, technological advances are likely to affect and change every field, including education and online learning. Therefore, it is important to consider how new technologies and interactions can benefit learning, specifically in online courses.

How to Use This Theory to Describe and Analyze Interactions in Learning Contexts?

As specified earlier, this framework is designerly and originates from the area of broader design theory. Prior to utilizing this framework in the context of learning design and technologies, it was important that I operationalized each

dimension of interaction. An important part of this scholarly effort was a consultation with one of the authors of the framework. The purpose of this consultation was to ensure consistency with the meaning of the original definitions when operationalizing dimensions of interaction included in the framework. The author again stressed that the framework was designed to be in service of the designer; thus, it is flexible. I utilized this framework to study design intent and purpose of interactive elements and objects that designers created to support authentic learning in fully online courses. As Janlert and Stolterman (2017) emphasized, the framework is meant to provide flexibility for interaction analysis. Therefore, I should not force it to fit into my study but rather apply those dimensions that made sense to me for the purpose of my study. As such, my goal was to apply the framework when it was applicable and augment the existing framework by adding more insights and descriptions about interactions, if any, in the context of online learning. That is, I operated with dimensions of interaction that were clearly suitable for analyzing interactions at hand. I excluded dimensions of interaction that seemed to be close in meaning and were difficult to differentiate, such as independence (i.e., overlaps in meaning with agency) and predictability (i.e., overlaps in meaning with receptivity). Additionally, because my study focused on the designer's perspective and their interpretation of interactions, I removed the “Awareness Level” dimension, as it could only be analyzed from a user’s perspective and could vary from user to user. Table 1 provides operational definitions of dimensions of interaction based on the framework and questions that I formulated based on the operational definitions.

Table 1

Operationalized Windows of Interaction Framework

Dimension of Interaction	Theoretical Definition	Operational Definition	Possible Questions to Designers
Agency	“Actions of both parties (human and artifact or system) are guided by some internal design to achieve certain goals.” (p. 49)	The designed learning interaction is guided by a certain intent that affords the learner to accomplish a specific goal. The agency window varies from low, medium to high.	Generally speaking, what do you hope learners will do or accomplish with this learning interaction?
Receptivity	“[...] discernible connection between what the user does and what it [artifact or system] does.” (p. 52)	The designed learning interaction is responsive to the learner’s input in a logical manner. The receptivity window varies from low, medium to high.	What designed learning interaction will communicate to the learner if they did X or Y?
Freedom of Action	“The freedom with respect to actions that have an impact on the artifact or system in a way that the designer intends.” (p. 53)	The designed learning interaction has a range of options for learners to choose from, as the designer intended. The freedom of action window varies from low, medium to high.	What options did you include for learners to choose from in this designed learning interaction?
Pace/Time	“Interaction with a bounded interval within	The designed learning interaction is intended to be	How much time did you intend for the learner to dedicate to this designed

Dimension of Interaction	Theoretical Definition	Operational Definition	Possible Questions to Designers
	which interaction must be located to remain feasible." (p. 55)	completed by the learner slowly or quickly. The pace/time window varies from low, medium to high.	learning interaction?
Attention Demand	"The minimum level of attention objectively required by the artifact or system." (p. 56)	The designed learning interaction mandates a certain degree of focus. The attention demand window varies from low, medium to high.	What level of attention did you think learners should use for this designed learning interaction? OR Do you think learners can engage with this learning interaction while being engaged in another task?

Example of How the Theory Has Been Applied

I applied this theory in my dissertation study research at Indiana University Bloomington (Abramenka, 2022). I worked closely with scholars from both the Instructional Systems and Technology as well as Human-Computer Interaction and Design disciplines. The focus of the study was to provide detailed and interpretative accounts of what interactions were designed, how interactions were designed from the instructional designer's perspective, and what the design intent was behind interactions to support authentic learning in higher education online courses. Further, my study investigated how instructional designers interpreted their experiences and how those interpretations and the meanings that they attributed to authentic learning and interactions manifested in their design work. I interviewed 15 instructional designers working in higher education. These instructional designers presented different learning objects/design artifacts that included various types of technology-level interactions. The artifacts demonstrated how the designers' overall design philosophy and perspectives about authentic learning and interactions were manifested in concrete design examples. I used the Window of interactions framework to analyze the characteristics of the demonstrated design artifacts and find the links between their characteristics and the learning goals that instructional designers had while designing their artifacts.

Based on the analysis of interactions using the Window of Interaction framework, the purpose behind designing certain interactions in online courses was determined as: (1) to sustain learner's attention and content comprehension, (2) to engage in the learning process, and (3) to encourage student-student (human level) interactions. For full description of the analysis of interactions within the demonstrated learning objects and examples, please refer to the full text of the dissertation study (Abramenka, 2022).

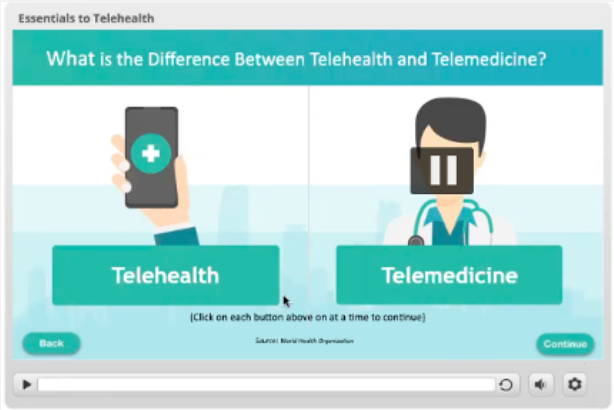
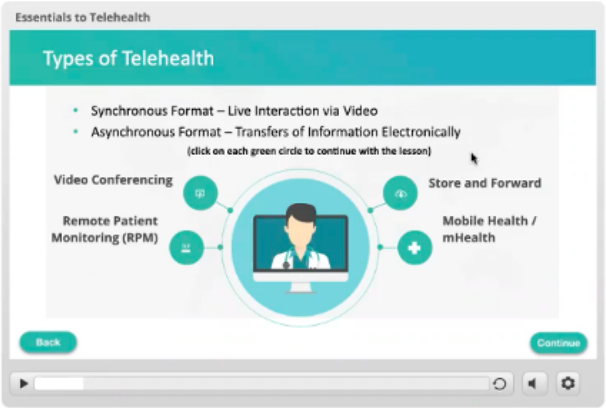
Interaction Intent 1: Sustain Learner's Attention and Content Comprehension

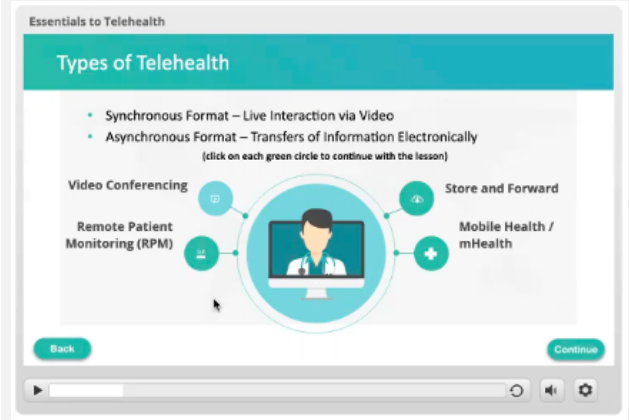
Eleven participants explained that the intent and purpose behind including technology-level interactions was to draw students' attention to important content that they needed to comprehend prior to going on to complete authentic learning tasks. In addition, the participants reported designing interactions within their objects that would allow students to practice and revise key theoretical concepts to ensure their understanding of required background knowledge.

The key insight that the designers shared was that their designer's role was to make sure that, as a result of their design, students looked at the required resources, read them, watched them, and comprehended them. Authentic learning projects required students to have certain background knowledge and skills prior to completing real-life simulations, working with a real client, or designing their own product, like a game for learning. Figure 1 shows types of interactions the designer created to sustain learners' attention and content comprehension.

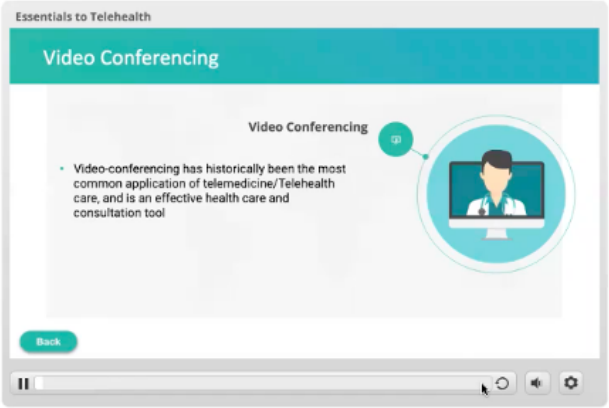
Figure 1

Example of a Video Presentation Designed with the Use of an Authoring Tool Characterized by High Agency, Low Attention Demand, and Middle Receptivity

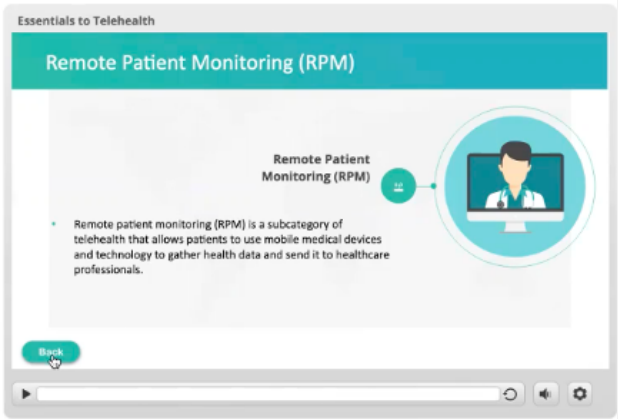
Images of the object and interactions	Brief description
	Students cannot move forward without listening to the narration until the end.
	Students cannot click "Continue" without listening to the end (difference between Telehealth and Telemedicine).
	Students cannot click the "Continue" button without listening to each type of telehealth.



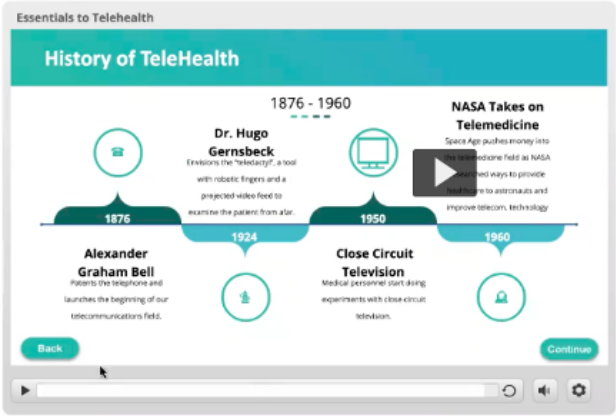
To signal that a student has already listened to a particular type of telehealth (e.g. “Video Conferencing”, “Remote Patient (Monitoring RPM)” etc.) an icon turns gray. For instance, in the image to the left, the “Video Conferencing” icon is graying out to show that a student has listened to this part.



This is how a slide looks like when a student clicks the “Video Conferencing” icon.



This is how a slide looks like when a student clicks the “Remote Patient Monitoring (RPM)” icon. Students have the option to go back to the menu with four different types of telehealth.

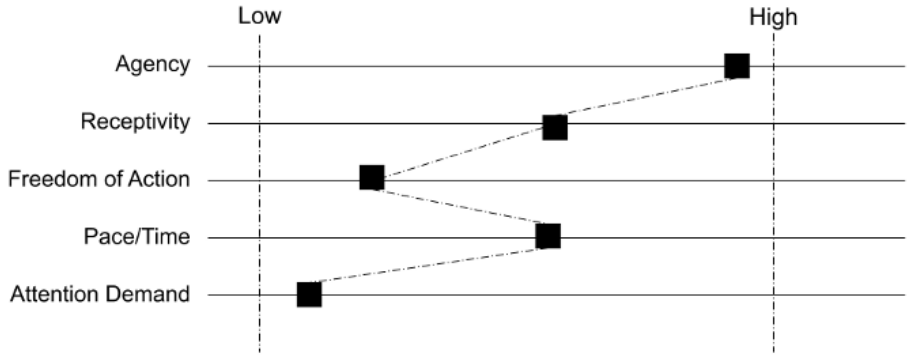


The History of Telehealth timeline where text next to each year appears when the narration about a particular year starts. When students just get to this slide, they see only the timeline with years without text.

Applying the Window of Interaction framework (Figure 2) allowed uncovering key characteristics of this category of interactions. For instance, it is worth noting that, while it was important to have a high-level attention demand for the presented content and authentic learning activities, the demonstrated objects had a low-level attention demand from a technical point of view. Therefore, low attention demand was noted to help sustain students' attention on key information. That is, as the designer's intent was to make sure students comprehended important content related to authentic learning tasks, they designed their objects in such a way that students could easily accomplish this goal. Therefore, in designing their objects, they intended them to be as simple and efficient as possible to use. Further, high agency and low attention demand were noted, but receptivity was close to the middle of the spectrum. Based on the demonstrated examples, this was because some of the designed interactions would not allow students to choose what content to start with or skip content.

Figure 2

Analysis of the Above Object using the Window of Interaction Framework



Interaction Intent 2: To engage in the learning process

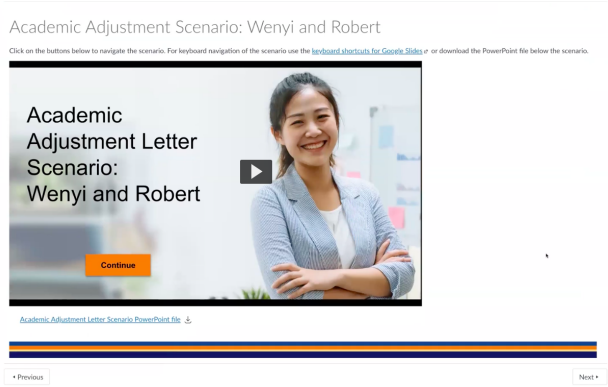
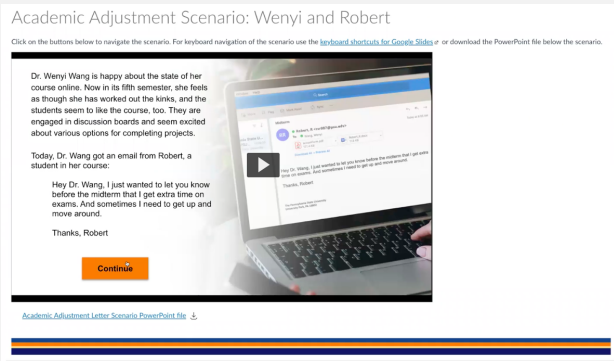
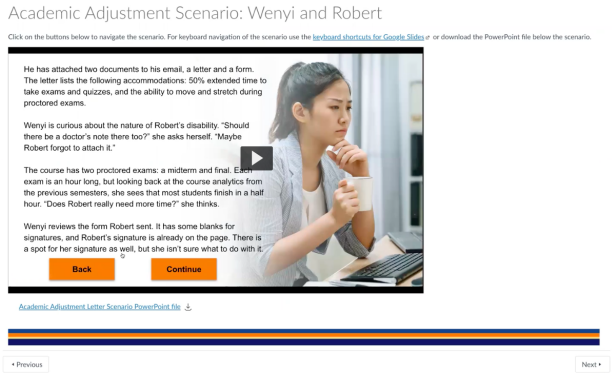
Ten designers specifically discussed engagement as the purpose of making learning content and activities dynamic and interactive. Here is an example from one designer who talked about how the design of interactions in the form of a branching real-life scenario with the use of a web-based tool (Figure 3) makes learning more authentic and more engaging.

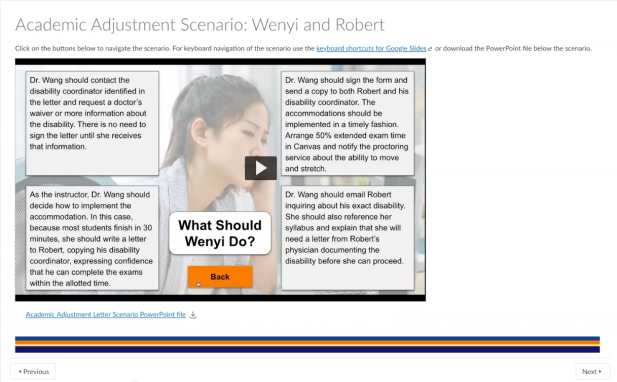
> *This course has to do with how instructors can best support students through providing necessary accommodations to their students. Instead of providing a list of policies and rules, my goal was to put it in a real-world situation with a series of choices of typical reactions that instructors might have in a given*

situation. One of the choices is the recommended course of action. I really wanted to make it relevant to our instructors and interactive through providing choices and consequences of each choice. It's a short scenario, it's simple, it's concise, and it's easy to interact with.

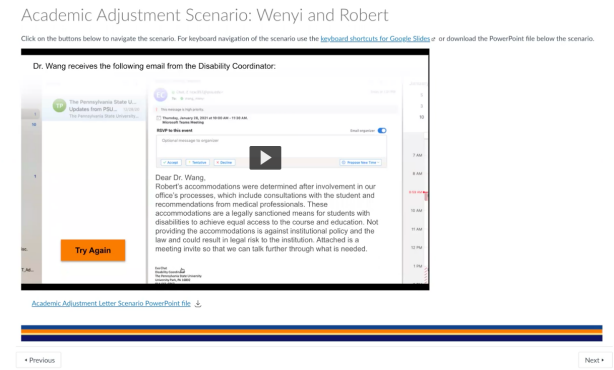
Figure 3

Example of a Simulation as a Branching Scenario with Choices Set Up with the Use of Web-Based Presentation Tool

Images of the object and interactions	Brief description
	The image shows how an embedded presentation with a branching scenario looks like on a course site/an LMS page.
	The image shows how the scenario looks and the “Continue” button to go to the page of answer choices.
	The image shows the continuation of the scenario and navigation option to continue through the scenario.



The image shows answer choices that students can click on and see the response right away.



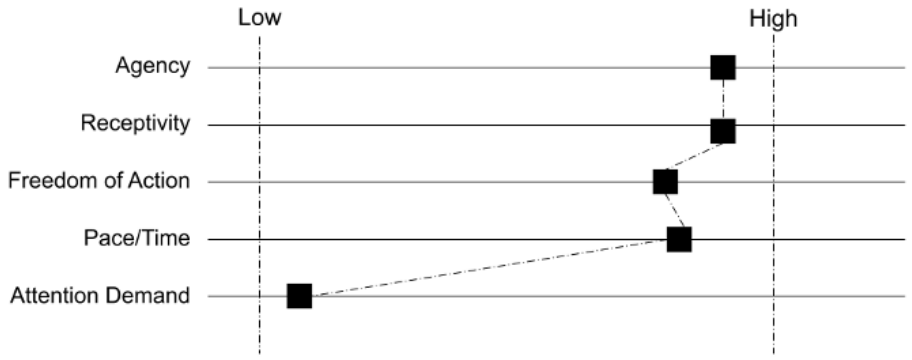
The image to the left is a specific choice that a student can make from the above listed choices of scenario.

The image shows the instant feedback that a student receives when choosing an option. The given example shows feedback to the option that represents a recommended course of action.

Through applying the Window of Interaction framework (see figure 4 for analysis), it was possible to conclude that interactions in this category were characterized by high agency, receptivity, freedom of action, and low attention demand. Such characteristics are understandable because these help students to get engaged in the learning process. Additionally, objects with interactive elements should be intuitive, responsive to one's input, and provide choices within that experience. High freedom of action specifically makes sense when it comes to authentic learning, as scholars have discussed the importance of helping students find their path and have/find voice in their learning (Kreber et al., 2007; Shaffer & Resnick, 1999; Stein et al., 2004; Wald & Harland, 2017). As mentioned above, low attention demand within an object referred to the low demand for human-level interaction so that students can focus on the authentic tasks themselves versus the features of the object. Therefore, from a pedagogical perspective, students need to invest effort and time to complete a specific learning task. However, from a perspective of technology-level interaction, the designers intended to make learning objects as easy as possible to navigate so that students could focus on the content and course-related tasks.

Figure 4

Analysis of the Above Object using the Window of Interaction Framework



Interaction intent 3: To encourage student-student (human level) interactions

Along with fostering engagement with authentic learning content and tasks, five participants referred to the importance of fostering human-level interactions through computer-level interactions. Essentially, interactions that were embedded into objects, such as the "Comment" option in the discussion board tool, were meant to foster and maintain human-level interaction, such as student-student and student-instructor interactions. The participants specifically referred to the tools that they embedded into authentic learning tasks to stimulate human-level interactions. They referred to specific tools that allowed students to share feedback with each other through video or audio. For instance, in one object, students were asked to record feedback using a voice recording tool on other students' presentations related to authentic simulation. For this category, the designers demonstrated the tools provided by a learning management system. The study focused on the analysis of interactive elements that the designers created, rather on the default features of technology resources that designers used. Although it was still important to state that the purpose of using default features of technology resources was to encourage human-human level of interactions, the Window of Interaction framework was not applied for analysis of such interactions.

Therefore, this theory afforded a deep analysis of the characteristics of technology artifacts/learning objects and related them to the learning goals that instructional designers had. Further application of this theory in designing artifacts/learning objects could help investigate the intentionality of technology characteristics and their value for the learners, granted the ever-evolving nature of technologies and the realities we live in. Therefore, discovering and applying new tools, such as the use of the Window of Interaction framework, could help instructional design practitioners be more intentional and purposeful with their design.

Why Should Researchers in LDT Consider Using the Theory?

LDT research ought to answer the basic question of the design success or failure of the designed learning objects in establishing interaction. The Window of Interaction framework could be used in LDT research to see how interactive characteristics of specific technology resources are related to learning goals in diverse learning environments. That is, analyzing technology resources and their interactive characteristics, and then relating them to learners' characteristics and learning goals could make the design process more purposeful, ergo, improving the learning experience.

LDT discipline has recently started to be more accepting of approaches that could expand the repertoire of knowledge and skills related to designing learning experiences, after relying mainly on cognitive/psychological sciences. While knowledge of learning theories and instructional theories is helpful, it is also helpful to be reflective and considerate of a

learning context and the learners themselves. Therefore, discovering and applying new tools, such as the use of the Window of Interaction framework, could help learning/instructional design practitioners be more intentional and purposeful with their design work, toward more rigor and ethically driven processes/outcomes.

Connection Between the Theory and the AECT Mission/Values

The collective quest for designers, scholars, and educators at AECT is to promote scholarship and best practices in the *creation, use, and management of technologies for effective teaching and learning*. In this quest, LDT researchers should rely on all possible and rigorous theories that allow the field to understand better how learning interactions are evolving with technological means, how best to design learning interactions, and in what ways learning experiences in diverse contexts could be improved.

Using the Window of Interaction framework allows LDT researchers to arrive at an appreciation or evaluation of learning objects and determine their interactive qualities. As such, the scholarly efforts deepen our commitment to *excellence, high-quality artifacts, ethical conduct, and social consciousness*.

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Designing for Productive Disciplinary Engagement and Responsive Assessment with Situated Cognition and Expansive Framing

Daniel Hickey

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Formative Assessment | Situated cognition | Expansive framing | Productive disciplinary engagement

This paper summarizes over two decades of design-based research that insistently draws on situative theories of cognition. This research is consistent with the current focus of AECT and the AECT Research and Theory Division. This focus primarily concerns enduring problems in education and only secondarily concerns the technologies used to help address such problems. The first decade of research consisted of collaborations with leading innovators in multimedia and immersive learning. This resulted in a "multi-level" model of assessment that balanced formative and summative assessment, balanced extrinsic and intrinsic motivators, and boosted performance without "teaching to the test." The second decade primarily concerned online contexts and included extended research of "open digital badges" and other web-enabled digital credentials. Embedding the design principles from Randi Engle (1965-2012) for productive disciplinary engagement and expansive framing resulted in a comprehensive framework called Participatory Learning and Assessment (PLA). This research qualified widely-held assumptions about "authentic" and "real world" instruction to address enduring problems such as online instructor "burnout," student social isolation, synchronous vs. asynchronous learning, and secure online assessment. Recent and current efforts extended these ideas to address historical and continuing inequities in education and help define a new consensus on our theories of learning transfer.

Watch on YouTube

The Research and Theory Division (RTD) supports the core mission of the Association of Educational Communication and Technology (AECT). The division:

- Promotes the development and advancement of theory.
- Promotes, presents, and disseminates research and scholarship that encompasses multiple perspectives.
- Advocates the study of social and cultural issues in the field.
- Supports, fosters, and mentors emerging scholars (AECT, 2023).

These goals are consistent with evolving goals of the broader association. The reorganized *Handbook of Research on Educational Communication and Technology* in the fifth edition (Bishop et al., 2020) highlighted a move away from educational *technologies* and toward educational *problems*. In the *Foreword* of the fifth edition, Reeves and McKenney pointed out that "the bulk of the scholarship in educational technology and communications has been focused on 'things' rather than on 'problems'" (2020, p. vii). In response, most chapters in the latest handbook "focus on difficult problems and how they can be addressed through *innovative* designs and *appropriate* technology" (p. vi, emphasis added). Reeves and McKenney pointed to persistent problems such as racial equity, teacher training, sustainability, and external partnerships as areas where AECT members should be directing their efforts.

In this spirit of innovative designs and appropriate technologies, this article summarizes a comprehensive approach to instruction and assessment that my colleagues and I call *Participatory Learning and Assessment*, or PLA. This approach emerged across two decades of design-based research. As will be elaborated, the first decade consisted of research-practice partnerships with leading innovators in instructional multi-media and educational video games; the second decade of research was mostly carried out in online learning using widely available tools.

This research has focused on enduring problems that transcend technology and that arguably eluded prior theories. Some of these problems have been relatively general:

- Balancing intrinsic and extrinsic motivation.
- Balancing formative and summative assessment functions.
- Raising achievement without teaching to the test.
- Overcoming historical and continuing discrimination and inequities.

Other problems targeted by this research have been more specific to online learning.

- Minimizing instructor burnout from excessive private instructor-student interaction.
- Reducing online learner isolation and increasing social engagement.
- Supporting online peer interaction in the absence of synchronous interaction.
- Ensuring valid online assessment evidence without intrusive and expensive online proctors.

This research draws intensively on contemporary situative theories of cognition (i.e., Lave & Wenger, 1991; Greeno, 1998). This work goes well beyond widespread characterizations of situated *learning* in terms of "authentic" and "real-world" contexts for instruction and assessment (e.g., Herrington et al., 2014). In particular, this work draws on the design principles that emerged in the research of Randi Engle (1965-2012) and colleagues. These principles suggest caution when drawing on authentic contexts defined by disciplinary experts. Instead, these principles suggest that learners problematize (i.e., contextualize) instruction from their own perspectives (which experts may or may not deem authentic).

This research addresses a fundamental issue that emerged across two "expert consensus study reports" from the US National Research Council (NRC) and its successor, the National Academy of Sciences, Engineering, and Mathematics (NASEM). These reports are written by a carefully selected group of experts following a strict process that captures the consensus of that committee at that time. *How People Learn: Brain, Mind, Experience, and Schooling* (NRC, 2001) provided a consensus view of learning and transfer that strongly reflected the socio-constructivist orientation of committee co-chair John Bransford and was embraced by many cognitive scientists and educational psychologists at that time. The title and contents of *How People Learn II: Learners, Contexts, and Cultures* (NASEM, 2018) reflected the "social turn" (e.g., Gee, 1999) that was already underway when 'HPL I" was drafted. HPL II revealed a new consensus that (a) contexts and culture matter a lot in learning and (b) that contexts and culture matter a lot more than a similar group of experts concluded two decades earlier. It is noteworthy that HPL I included a chapter on the transfer of learning but *not* a chapter on culture, while HPL II included a chapter on culture but *not* a chapter on transfer. This suggests a lack of consensus and perhaps open disagreement about the implications of this social turn for our theories of transfer. This is important because our theories of transfer have profound implications for designing instruction, assessing learning, and testing achievement. The research summarized here aims to support a new consensus by deeply exploring the implications of situative transfer theories for instruction, assessment, and testing in light of other more established theories (Hickey & Pellegrino, 2005).

Responsive "Multi-Level" Assessment

The first phase of this research aligned formative and summative functions across multiple levels of increasingly formal assessments. This research drew on the assessment levels used in the more naturalistic evaluations of STEM curricula in Ruiz-Primo et al. (2002) and the innovative "conversational" approach to formative assessment in Duschl & Gitomer (1997). This phase consisted of design-based research in partnership with educators and students learning to use the innovations of leading technology innovators. The core approach emerged in studies of the *GenScope* multi-media curriculum for teaching introductory inheritance developed by Paul Horwitz (Hickey, Kindfield, et al., 2003). The approach was quasi-experimentally validated in studies of GenScope (Hickey & Zuiker, 2012), the *Quest Atlantis* videogame (Barab et al., 2007; Hickey, Ingram-Goble, & Jameson, 2009), and STEM multi-media programs from the

NASA-funded *Classroom of the Future* (e.g., Hickey, Taasobshirazi, & Cross, 2012). The approach was further refined in studies of participatory new digital media developed by the media scholar Henry Jenkins (Hickey, McWilliams, & Honeyford, 2011; Hickey, Honeyford, &McWilliams, 2013), and considerations of vocational education (Hickey, 2005).

At the core of this approach is the idea that a broader situative view of learning allows the same assessment to serve a summative *function* for one form of learning and a formative function for a different form of learning. Doing so sidesteps socio-constructivist concerns that summative assessment *purposes* undermine formative purposes (e.g., NRC, 2001; Pellegrino, 2002). The four assessment levels aligned in most of this research included the following:

- *Immediate* informal assessment of discourse.
- *Close* reflections on engagement.
- *Proximal* assessments of understanding.
- *Distal* tests of achievement.

Thus, for example, the close reflections on engagement can summatively assess prior engagement while also formatively assessing conceptual understanding. Changing knowledge representations across levels requires learners to transform the knowledge gained from formative feedback at the prior level. Directly addressing the widely cited concerns of Messick (1994) regarding *construct-irrelevant easiness* (i.e., "teaching to the test"), this preserves the validity of scores as meaningful evidence of learning. As long as learners were not directly prepared for each assessment, those scores are reliable estimates of transfer when grading work, measuring achievement, and evaluating curricula.

Productive Disciplinary Engagement and Participatory Learning and Assessment

Our approach was first labeled PLA and further theorized when it moved into online learning around 2009. This approach was deemed "responsive" for responding to the different forms of knowing assessed at each level. As shown in Table 1, the assessments across levels capture (a) increasingly *formal* knowledge representations, (b) broader curricular orientation, (c) increasingly private *interactions* (after Hall & Rubin, 2013), and (d) lengthier *timescales* of learning (after Lemke, 2000).

Table 1

Responsive Assessment in Online Learning

	Example	Orientation	Formality	Interaction	Timescale
IMMEDIATE	Informal assessment of discourse via instructor comments on learner annotations and artifacts	Interactions	Very informal	Public	Hours
CLOSE	Summative assessment of engagement and formative assessment of understanding via student reflections	Activities	Informal	Local	Days
PROXIMAL	Summative assessment understanding and formative assessment of achievement via self-assessments	Curriculum	Semi-formal	Private	Weeks

	Example	Orientation	Formality	Interaction	Timescale
DISTAL	Summative assessment of achievement via secure time-limited multiple-choice achievement tests	Achievement	Formal	Discreet	Months

At the advice of James Gee, we embedded the design principles for *productive disciplinary engagement* (PDE; Engle & Conant, 2002) within these multiple assessment levels. These principles suggest that learners (a) *problematize* content from their own perspectives, (b) be given *authority* to solve the problems that result, (c) be held *accountable* to the discourse of the discipline, and (d) be given *resources* necessary to accomplish the first three principles. As introduced in Hickey and Rehak (2013), this synergy resulted in the comprehensive PLA framework. This new framework consisted of the five following situative design principles:

1. Use public contexts to give meaning to knowledge tools.
2. Recognize and reward productive disciplinary engagement.
3. Grade artifacts through local reflections on engagement.
4. Let individuals assess their understanding privately.
5. Measure achievement discreetly as necessary and appropriate.

In short, the first two PLA principles embrace Engle's PDE principles and the first assessment level, while the last three PLA principles represent the three other assessment levels.

A central idea in PLA is that public (to the class) contexts for student engagement were possible and reasonable when each student was problematizing content from their own perspective. Once each student has defined an initial context for problematizing course content, peers are ideally positioned to learn from each other, borrowing examples and insights, but necessarily transferring them to their own contexts, while thwarting plagiarism.

This public engagement was initially supported by the wiki tools in the open-source *Sakai* LMS, in what we called "wikifolios." Subsequently, we have come to rely on google docs (i.e., "G-portfolios") or the headers of new discussion forums in the Canvas and Blackboard LMS ("E-portfolios"). Working in Google Docs and discussion forum headers supports discussion via threaded instructor and student comments. But conventional forums are never used for substantive discussions in PLA. This reflects concerns that Thomas (2002) and others have raised about the incoherence and abstraction of traditional discussion forums. Instead, most interaction occurs via threaded comments directly on student artifacts or via social annotations on learning resources. In many cases, regular hyperlinked instructor announcements support additional focused interaction (see Feguson et al., 2010). This concrete interaction directly involving student artifacts and annotations supports a key insight that emerged early on in this work: *most students are happy to engage in discussions when their own work and their own ideas are in play.* Thus student posts or discussions are never graded and are seldom even required. This minimizes the dreary discussions that mandatory and graded posts often cause.

Extending PLA with Expansive Framing

The design principles for *expansive framing* emerged when Engle (2006) re-analyzed the student engagement and assessment performance from the original 2002 study. Engle searched for interactions responsible for "generative" learning that transferred readily and widely to performance assessments that were very different from the learning environment. She concluded that generative learning was best supported when students were (a) pushed to find numerous connections with people, places, topics, and times beyond the boundaries of the course and (b) encouraged

to position themselves as accountable authors who were contributing to a larger conversation that extends over time and space. These principles were rigorously validated in the experimental study in Engle et al. (2011) that compared expansively framed tutoring sessions in biology with “bounded framing” where learners were not pushed to make connections or position themselves as authors.

Engle et al. (2012) further elaborated on expansive framing. They explained how expansive framing could support *intercontextuality* (Bloome et al., 2009). This is where learners form so many connections between their prior experience, current outside goals, and future contexts that the learning process becomes part of a larger “encompassing context.” Experienced writers will recognize this state as the epitome of authorship. In support of this seemingly elusive goal for students, Engle et al. (2012) provided five compelling explanations for why expansive framing and intercontextuality should support generative learning:

1. *More intercontextuality between settings.* Helping learners imagine how they will use what they are learning in the future naturally leads them to adopt more productive learning strategies rather than simply completing the assignment.

2. *Recognizing relevance.* If learners have successfully imagined using what they are learning, they are more likely to recognize those opportunities for transfer when they present themselves.

3. *Transfer in prior knowledge.* The third explanation of expansive framing is positioning learners as authors of their own ideas will encourage them to transfer in more of their own relevant prior experiences. To the extent that peers find these experiences useful for their own learning, learners will be encouraged to transfer in even more of their prior experiences.

4. *Accountability to content.* If students successfully author new content at the intersection of their experiences and course content, they are more likely to feel a sense of “ownership” over that content. This is likely to engender confidence when using that knowledge in potential transfer settings.

5. *Generalization of authorship.* If students take up enough opportunities to author new knowledge, this experience should generalize to other knowledge in the domain and ultimately to knowledge in new domains.

Engle and colleagues provided empirical examples from other research to support each of these explanations. Presciently, in Engle’s last publication before her untimely death, the 2012 paper also detailed a potential research agenda for expansive framing in the form of three types of studies that might be used to examine how expansive framing impacts transfer. These studies included *disentangling experiments*, *comparative classroom studies*, and *microgenetic investigations*. In key respects, our program of research aims to lay the theoretical and methodological groundwork for pursuing such efforts and moving this research into online settings.

Motivational Implications of PDE, Expansive Framing, and PLA

Before considering our current and future efforts, we point out that embedded within and (sometimes) alongside this assessment-related work is a situative consideration of motivation. This strand is rooted in early efforts to reframe motivation research from the study of individual factors to the study of broader social and cultural factors (e.g., Hickey, 1997; Hickey & McCaslin, 2001; Sivan, 1986). This work aimed to help resolve the acrimonious debates over the consequences of “extrinsic” rewards for “intrinsic” motivation (e.g., Cameron & Pierce, 1994, vs. Ryan & Deci, 1996). Readers are reminded that hundreds of experimental studies of the so-called “overjustification effect” (Lepper et al., 1973) have shown that intrinsic motivation and engagement in free-choice activity are diminished when learners are provided with arbitrary “extrinsic” rewards for their efforts (Tang & Hall, 1995). Readers are also reminded that this seemingly intractable debate illustrates how experimental and meta-analytic methods can’t resolve such fundamental issues rooted in competing theories of learning (see Lepper et al., 1999).

Central to both the motivation and assessment work is one of the most important but least appreciated aspects of situative theory. The so-called *situative synthesis* concerns the way that one reconciles the tensions between (a) the way humans behave and process information, (b) the way that humans make sense of the world around them, and (c) the way that social and cultural systems function. As introduced in Greeno and Moore (1993) and elaborated in Greeno (1998), the prevailing "aggregative" reconciliation uses the aggregated activity of individuals to explain the functioning of larger sociocultural systems. In motivation, this is perhaps best illustrated by Bandura's (2000) theory of *collective efficacy*, whereby the efficacy of the group is entirely made up of the self-efficacy of the members of the group. This aggregative characterization of social and cultural activity assumes that there is no "disembodied group mind" (p. 76) that is independent of the collective beliefs of the members.

In contrast, the situative synthesis characterizes the activity of individuals as "special cases" of sociocultural activity. In other words, human behavior & information processing, *and* human sense-making are ultimately best explained in terms of participation in social and cultural practices. A worthwhile caveat here highlights the difference between the work of learning scientists and the work of cognitive scientists. As a learning scientist, I have pursued new solutions to enduring problems by *assuming* that the situative synthesis is true (rather than arguing that it *is* true). In doing so, I sidestep the more fundamental naturalistic debates about the nature of human cognition, as played out in the widely-cited debate between Anderson et al. (1996) and Greeno (1997). Rather, I ask whether *assuming* that intrinsic *and* extrinsic sources of motivation are both special cases of socially situated activity reveals a new path forward in this seemingly intractable debate (Hickey, 2003). In pragmatic terms, this means moving beyond the prevailing study of sociocultural influences on individual motivation to explore how sociocultural and situative theories of learning lead to entirely new theories of motivation (summarized in Hickey & Granade, 2004) and related issues such as classroom management (Hickey & Schafer, 2006)

This new way of thinking about extrinsic incentives was explored in a quasi-experimental study of two pairs of carefully matched classrooms playing Quest Atlantis. Students in two classrooms were provided extrinsic incentives (i.e., "badges" for their physical and virtual avatars); students in the other two classrooms were instead encouraged to fulfill their curiosity and interests (following Lepper & Malone, 1987). Multiple levels of assessment and motivational measures revealed that the students in the extrinsic incentive condition showed significantly larger gains in disciplinary learning knowledge and significantly greater disciplinary engagement and situational interest. Rejecting the overjustification hypothesis, the students who were rewarded with extensive incentives demonstrated slightly larger gains in personal interest in the topics studied (Hickey & Filsecker, 2012; Filsecker & Hickey, 2014)

In a subsequent program of research, the situative synthesis uncovered promising new ways of using and studying digital "badges" and other "micro-credentials." In contrast to conventional assessments and credentials, these new open digital badges could contain actual claims of competence and links to web-enabled digital evidence supporting those claims. As elaborated in Casilli and Hickey (2016), these developments have profound implications because they downplay the value of traditional approaches to validation (of evidence) and accreditation (of credential value) while elevating the importance of perceived *credibility* (which has long been dismissed as an element of "face" validity, Popham, 1990). Naturally, these new ways of recognizing learning and achievement helped rekindle the debate over extrinsic incentives. Following their widely reported introduction in a national competition, several influential observers argued that such badges were inherently extrinsic (i.e., Jenkins, 2012; Resnick, 2012). But a longitudinal study of the thirty badges systems funded in the national competition (Hickey, Willis, & Quick, 2015) uncovered four very different types of badge systems:

- *Competency-based* systems awarded badges for individualized mastery of specific competencies. These badges were associated with external (i.e., "extrinsic") incentives such as course credit or new opportunities.
- *Completion-based* systems awarded badges for completing complex investigations, projects, and portfolios. These badges focused more on intrinsic sources of motivation such as interest and curiosity.
- *Participation-based* systems awarded badges for participation in social learning and group projects. Arguably these badges were more focused on "engaged participation," a more sociocultural form of motivation introduced in Hickey (2003).
- *Hybrid systems* awarded badges for two or three of the above functions.

A follow up study found that the participation-based badge systems were far more likely to result in a thriving badge-based "ecosystem" after the initial funding was exhausted. It turned that most of the other badge systems were unable to sustain (or, in some cases, even implement) their ambitious plans for individualized assessment of competency or completion (Hickey & Chartrand, 2020).

Reflecting the value of a new situative synergy involving both motivation and assessment, this work resulted in an extensive set of design principles for "where badges work better" (Hickey & Willis, 2017; Hickey, Willis, & Quick, 2015), a new framework for badge functions (Hickey, Uttamchandani, & Chartrand, 2020), and seven "new arguments" about motivating learning with digital badges. As elaborated in Hickey & Schenke (2019), these new arguments are:

1. *Digital badges are inherently meaningful.* Relative to traditional incentives and credentials, digital badges can contain specific claims and evidence supporting those claims that make them more meaningful
2. *Open digital badges are particularly meaningful.* Digital badges consistent with the Open Badges Infrastructure metadata system can be readily shared and read by humans and machines and can circulate in social networks where they can gain additional meaning
3. *Open digital badges are particularly consequential credentials.* Newly available "endorsement" features make it possible for issuers of open digital badges to invite organizations to formally endorse a class of badges before they are issued and then endorse individuals (e.g., members or that organization) to endorse a specific badge after examining the claims it contains in light of the provided evidence.
4. *The negative consequences of extrinsic rewards are overstated.* While the overjustification effect is real, a focus on it overlooks other relevant factors. These include the potentially positive short-term behavioral consequences of extrinsic incentives, their apparently positive neurological consequences (Hidi, 2016), and their joint potential for fostering "communal" motivation. It seems possibly and even likely that these other factors may well overwhelm any potential negative consequences that follow from the overjustification effect.
5. *Focus primarily on social activity and secondarily on individual activity.* This follows directly from the situative synthesis above. Theoretically, this means understanding both extrinsic incentives and intrinsic motivators and as special cases of socially engaged participation. Practically, this means studying the consequences of badge systems for learner discourse before considering their consequences for individual behavior or cognition.
6. *Situative models of engagement are ideal for studying digital credentials.* Most open digital badge systems are used to recognize learning in digital networks, most of which feature social components. Brown and Adler (2008) pointed out that digital social networks represent a fundamentally new form of engagement that transcends traditional models that focus on individual behavior or cognition.
7. *Study motivation and digital credentials at three increasingly formal levels.* Consistent with the study reported in Filsecker and Hickey (2014), this means examining the impact of badges on (a) productive disciplinary engagement, (b) intrinsically motivated engagement and situational interest, and (c) changes in personal interest and the broader educational ecosystem.

Recent and Current Efforts

Recent years have included efforts to use PLA to design a range of online learning contexts. This includes undergraduate courses in learning theory (Chartrand et al., 2020), graduate courses in education (Hickey, 2015a, 2015b), a fully online secondary school (Itow, 2018), self-paced technical training courses (Hickey, Duncan, et al., 2020), and "big" open online courses completed by hundreds (rather than thousands) of open learners (Hickey & Uttamchandani, 2017).

Another strand of our recent efforts is presenting the PLA framework in a less-theoretical manner for broader audiences. Hickey, Chartrand, and Andrews (2020) translated the five PLA design principles into 15 discreet steps for instructional designers who are presumably more grounded in cognitive-constructivist theories of learning. Hickey, Duncan, et al. (2020) presented a subset of those steps for designing g-portfolio courses. These steps were presented without the design principles or theory and were intended for educators who are moving online but have little or no grounding in learning theory. These two papers have been useful in two self-paced professional development courses used by hundreds of secondary teachers who transitioned to online learning during the pandemic (Chartrand & Hickey, 2020; Hickey & Harris, 2020).

One strand of our current efforts is advancing new design principles that are specific to particular audiences. Hickey and Harris (2021) extended PLA into a new set of design principles specifically concerning assessment in online courses:

1. *Embrace situative reconciliation over aggregative reconciliation.*
2. *Focus on assessment functions rather than purposes.*
3. *Synergize multiple complementary types of learner interaction.*
4. *Use increasingly formal assessments that capture longer timescales of learning.*
5. *Embrace transformative functions and systemic validity.*
6. *Position learners as accountable authors.*
7. *Reposition minoritized learners for equitable engagement.*
8. *Enhance the validity of evidence for designers, evaluators, and researchers.*
9. *Enhance the credibility of scores and efficiency for educators.*
10. *Enhance the credibility of assessments and grades for learners.*

Readers may note that this set combines principles from our prior efforts with a new principle from other current efforts (described next). This synergy illustrates a key point of design-based research—that it evolves continually.

This new strand of work embraces contemporary "asset-based" responses to historical and continuing inequities and discrimination to provide a practical and theoretical alternative to outdated "deficit-based" responses. This work draws directly from the critique of Engle's PDE principles by Agarwal and Sengupta-Irving (2019). Reviewing the four PDE principles summarized above, they first conceded that (1) problematizing invites students to transfer in their unique cultural and linguistic experiences, (2) granting authority to explore those problems gives students an active role in constructing knowledge, (3) accountability ensures that authority comes with a justification that is open to critique, and (4) providing culturally relevant resources might tap into diverse student interests.

Agarwal and Sengupta-Irving's (2019) concessions are important because they argue that PDE is inherently more asset-based than most other modern (e.g., socio-constructivist) curricular frameworks. Illustrating progress in this regard in the learning sciences, they questioned the extent to which the existing PDE principles will support students who identify

with minoritized communities, given the extensive evidence that such students are routinely "positioned out" of classroom discourse and/or positioned as lazy or disruptive by teachers and peers who are more advantaged and/or privileged (e.g., Paris, 2012). This means that implementing PDE (and by extension, expansive framing and PLA) while ignoring the realities of power and privilege limits support for equity. For example, Agarwal and Sengupta-Irving argued that problematizing content in ways that challenge culturally dominant ways of knowing can lead to racialized controversies that can harm minoritized learners. In response, they introduced new *Connective and Productive Disciplinary Engagement* (CPDE) principles for inviting minoritized students to position themselves as having unique experiences and (therefore) expertise. These principles are (1) use sociopolitical uncertainties (SPUs) to help problematize disciplinary knowledge, (2) curb undue social authority, (3) ensure equitable accountability, and (4) treat sociopolitical controversies as resources.

We have been using the CPDE principles to further refine a graduate course on educational assessment that has long served as the testbed for PLA ideas and practices. Over three annual cycles of iterative refinement, we have piloted new course features and then included the effective ones across assignments (Hickey & Lam, 2022, 2023). This work has resulted in a new framework that we are calling *culturally-sustaining educational assessment* (CSEA) that consists of a new set of assessment design principles:

1. Include optional sociopolitical uncertainties (SPUs) that invite, but do not require, students who identify with minoritized communities to position themselves as having valued relevant experiences and expertise.

2. Instructor informal assessment of disciplinary discourse should position *all* students as having valued experiences and expertise and carefully introduce additional SPUs as appropriate.

3. Encourage students to reflect on how social and cultural factors impacted their engagement without requiring them to speak for their community.

4. Instructors should read cultural reflections and directly respond to particularly compelling ones in public or private feedback as appropriate.

5. Include formative self-assessments for all student choice controversies to efficiently foster familiarity with those issues.

6. Include exam items that assess the achievement of some (but not all) of the controversies and SPUs and ensure that those items function appropriately.

Initial evidence from student engagement and anonymous course evaluations suggests that this approach has indeed been successful. For example, these new features appear to have encouraged students to introduce new SPUs beyond those presented in the assignments and to reveal minoritized identities (e.g., LGBTQ+) that might otherwise have remained hidden.

The other strand of our current work is helping ensure that Randi Engle is credited for the ideas that we are enthusiastically building on. While Engle (2011) summarized applications of the PDE principles through 2010 (and other related research), the larger body of work on PDE and then expansive framing has yet to be systematically reviewed. To this end, Hickey, Chartrand, and Harris (2021) systematically analyzed the 31 empirical studies that included these actual terms in their titles or abstracts. We are currently conducting a thematic review of the 2715 peer-reviewed publications that reference these two frameworks. Within this effort, Freedman et al. (2023) thematically analyzed the 32 publications concerning diversity, equity, and inclusion, while Harris et al. (2023) thematically analyzed the subset of this research concerning teacher education.

In this spirit of supporting Engle's legacy, we recently published an extended entry in an educational encyclopedia as a tribute to Engle's contributions (Hickey, 2022). Finally, a chapter in a forthcoming *Handbook of Educational Psychology* (Hickey & Lam, in press) argues for a new model of transfer that insistently includes ideas from Agarwal and Sengupta-

Irving. This brings equity and justice for the first time in discussions of transfer. In this way, we hope both sets of ideas find their way into a new situative/sociocultural consensus on transfer theory.

Appreciations, Concessions, Conundrum, and Conclusions

My colleagues and I deeply appreciate that these efforts were recognized by the runner-up *2022 Theory Spotlight Award* from AECT's Research and Theory Division. We also appreciate the foundations, agencies, and university initiatives (listed below) that supported many of these efforts, as well as the support and (sometimes) patience of the students, departmental colleagues, and administrators at the schools and universities where this research was conducted.

We concede that some of our ideas qualify (and potentially challenge) assumptions about learning theory and practice held by many members of AECT and the broader Learning Design and Technology community. We assume there will never be a "sociocultural revolution" that overturns or supplants prevailing theories and associated practices. For complex reasons, this is actually consistent with our goals and the situative synthesis summarized above.

While on the margins of this paper and this work, we believe that the situative synthesis can help address another theoretical conundrum in the LDT community and beyond. This conundrum concerns the divide between proponents of socio-constructivist theories and practices and proponents of cognitive-associationist theories that underpin artificially intelligent tutors, personalized adaptive learning technologies, and competency-based education. This divide helped fuel the dissolution/rebranding of the International Association of K-12 Online Learning (iNACOL) in 2018 and the establishment of several new organizations. Proponents of personalized competency-based learning within iNACOL formed the new Aurora Institute and broadened their focus beyond technology-based learning, with the continued support of the Gates and Zuckerberg foundations (Barnum, 2018, 2019). iNACOL members who advocated the socio-constructivist Community of Inquiry framework (e.g., Archambault et al., 2022) joined the newly formed *National Standards for Quality* and helped draft a new set of online teaching standards (National Standards for Quality, 2018) that emphasized collaborative learning and instructor-student relationships over personalized competency-based learning.

On the one hand, skeptics question the theory and evidence behind personalized competency-based learning (e.g., Enyedy, 2014, see Barnum, 2020; Pane, 2018; Pane et al., 2017). On the other hand, proponents point to supporting evidence (e.g., Koedinger et al., 2010; Connections Academy, 2018), while influential foundations and many policymakers appear convinced of the potential of personalized learning. Indeed our own research (Hickey, Robinson et al., 2019) found that one intelligent tutoring system was significantly more effective and dramatically more efficient in preparing students for success in a "gateway" undergraduate STEM course, compared to a remedial "developmental education" course. More pragmatically, hundreds of thousands of U.S. K-12 students are already attending full-time virtual schools or taking virtual courses from K-12 Stride Inc. or Connections Academy Inc. that largely rely on personalized computer-adaptive learning technologies. It seems that our academic programs might be well-served to more systematically advance and study these approaches.

In conclusion, we are encouraged by and encouraging of the many efforts in LDT and related communities to address the discrimination and injustice that continues to plague our educational systems. While much work remains to be done, recent years have seen a surge of relevant research in LDT (e.g., Glazewski and Ertmer, 2020), the Learning Sciences (e.g., Esmonde & Booker, 2016), and Educational Psychology (e.g., Zusho & Kumar, 2018). A central question that deserves further theoretical and empirical consideration is whether the claim that learner "agency" as supported by personalized competency-based learning is indeed the most effective and appropriate response to these challenges (as argued by Sturgis & Casey, 2018, see the Aurora Institute, 2023). It seems impossible that any single class of approaches can address this complex and multifaceted issue. Sustained, concerted, and well-supported effort is needed on all fronts.

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The Theory of Learning in Micro

Context & Explanation

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Design Knowledge chunking continual process microlearning

The Theory of Learning in Micro is a proposed theory on how people micro-learn. This theory is based on the hypothesis that learning is a continual process better supported with smaller, more focused learning resources and activities. Based on two main beliefs, knowledge and design, The Theory of Learning in Micro was crafted as a foundation for how people learn in micro, providing a set of beliefs and assumptions for the microlearning design and development community.

Watch on YouTube

Introduction

Learning is a complex process only observable or assessable after the intervention (Driscoll, 2014). This complex process is explained through learning theories derived from beliefs and assumptions of "how one comes to 'know'" (Driscoll, 2014, p. 5). These learning theories then undergo an iterative testing and refining process (Kerssens-van Drongelen, 2001). This paper describes the first iteration of a new learning theory focused on microlearning. The paper also argues for a theoretical stance to shape the design, development, and use of learning in micro.

Learning

The act of knowing comes from three learning processes: (a) natural, which occurs through experience and discovery, (b) instructed, which occurs based on a stimulus, and (c) cultural, which occurs through the community as something everyone needs to learn (Gee, 2004). Natural learning is typically connected to Piaget and Inhelder (1969) genetic psychology based on developmental milestones and is not connected with learning but with maturation (Driscoll, 2014). Instructed and cultural learning are planned learning but may or may not reside in formal education settings. Instructed learning is learning specific information while cultural learning is community-oriented, where certain information and practices are taught to everyone in that community (Gee, 2004). The learning environment (formal, informal, non-formal), modality (face-to-face, hybrid, online), resources (texts, devices, internet), and other items can differ in instructed and cultural settings (Gee, 2004; Hamilton et al., 2021; Schwier, 2012). Regardless of the environment, modality, and available resources, instructed learning, the learning focus of this paper, is typically considered in formal settings in a macro lens.

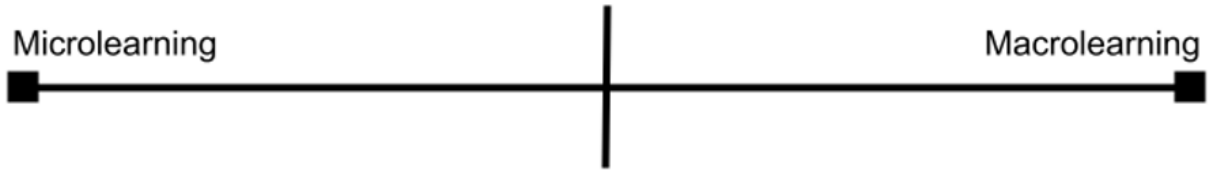
Macrolearning

Macrolearning is content presented in large quantities with formative and summative assessments, typically in face-to-face settings (Buchem & Hamelmann, 2010; Shenaman, 2021). Macrolearning typically ends when a certificate (e.g., HVAC certification) or degree (e.g., high school diploma, bachelor's degree) is awarded and takes a longer time to complete (Buchem & Hamelmann, 2010; Schwier, 2012; Zhang & West, 2020). If macrolearning sits on one side of a

learning spectrum, then microlearning would sit on the other with the necessary content chunked in shorter time periods (see Figure 1).

Figure 1

Microlearning to Macrolearning Spectrum



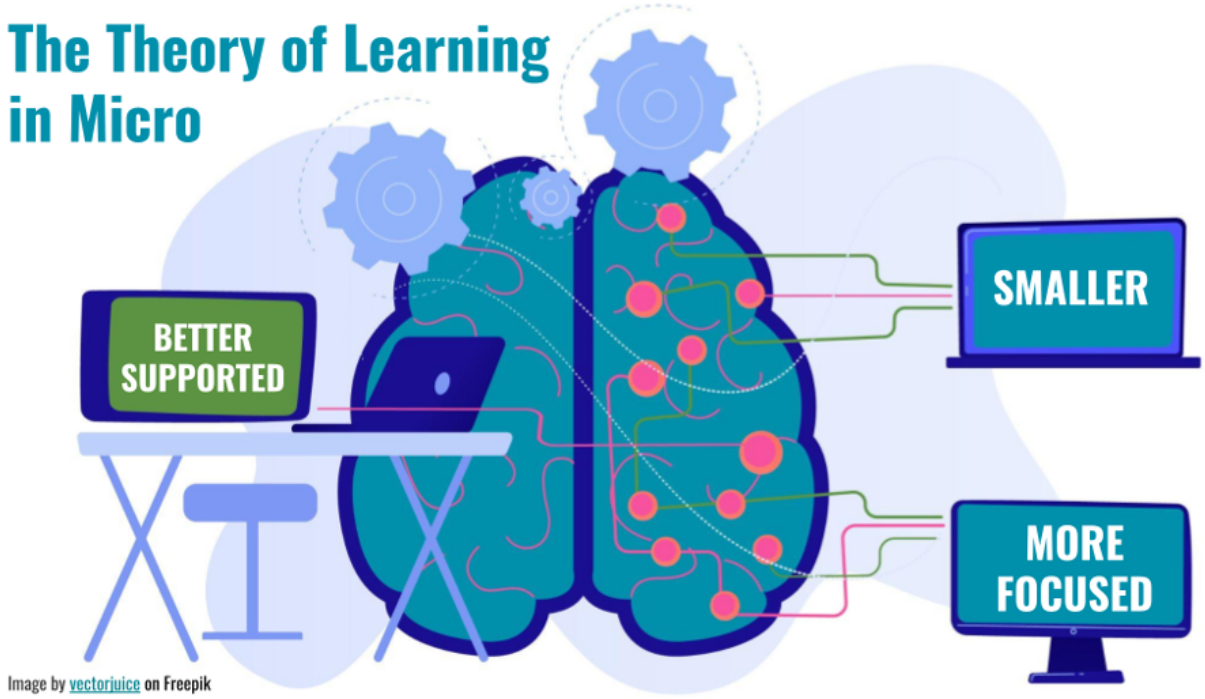
Microlearning

Microlearning is an emerging eLearning approach referring to bite-sized information presented in various short formats (Major & Calandrino, 2018; Tipton, 2020). The length of time for microlearning varies in the literature and is typically completed in no more than 15–20 minutes (Aldosemani, 2019; Manning et al., 2021; So et al., 2020) with some variations of longer amounts of time (see de Vries & Brall, 2008; Zhang & West, 2020). Buchem and Hamelmann (2010) differentiated between microlearning and micro-objects. They argued that content could be micro and the main focus of learning, absent from activities, while microlearning includes both content and activities. Resources, or micro-objects, that are less-than-one-minute have emerged in microlearning literature, especially with the rise of short video platforms such as TikTok and Instagram; however, Hamilton et al. (2021) called these less-than-one-minute learning segments an extreme form of microlearning, coined nano-learning. In the literature, nano-learning is less ubiquitous than microlearning, so we call any learning that is less than 20 minutes, including learning that is less than one minute long, microlearning.

We contend that learning in micro is different from macrolearning, and the process of "how one comes to know" (Driscoll, 2014, p. 5) is different with microlearning. The *theory of learning in micro* is based on the hypothesis that learning is a continual process better supported with smaller, more focused learning resources and activities (see Figure 2), but learning is still being designed in a macro-approach, regardless of established research (Madden & Govender, 2020; Tipton, 2020). To differentiate the theory of learning in micro from micro-objects (Aldosemani, 2019; Buchem & Hamelmann, 2010), we are proposing a theory focusing on how people learn in micro.

Figure 2

The Theory of Learning in Micro



Note. Adapted from "Brain with Digital Circuit and Programmer with Laptop. Machine Learning, Artificial Intelligence, Digital Brain and Artificial Thinking Process," by vectorjuice, n.d., *Freepik*.

Theory Description

The *theory of learning in micro* is based on two assumptions: (a) how content and procedural knowledge are gained in microlearning, and (b) how design impacts the gain of that knowledge. Within these two assumptions, the theory of learning in micro emerged, showcasing a gap in the literature on how people learn in micro.

Knowledge

The knowledge gained through microlearning includes two primary categories: acquisition and application of knowledge.

Acquisition

Knowledge acquisition of knowledge is the gaining of new information based on previous knowledge and schema (Adcock, 2013; Anderson, 1984; Sweller, 1988). Within knowledge acquisition with microlearning, two instances occur when compared to macrolearning: (a) microlearning better supports content knowledge acquisition than macrolearning (Manning et al., 2021; Polasek & Javorcik, 2019), and (b) in spaces where breadth of knowledge is more prioritized than depth, microlearning will better support this breadth of knowledge than macrolearning (Dingler et al., 2017).

Content Knowledge Acquisition

For content knowledge acquisition, smaller or shorter amounts of content support the cognitive load and working memory (Lee et al., 2013; Miller, 1956). Cognitive load is the amount of information someone can take in based on extraneous stimuli, prior knowledge, and intrinsic interest while moving learning from working memory to long-term memory (Lee, 2013; Paas et al., 2010; Sweller, 1988). Chunking, a term commonly associated with microlearning (Birch & Lewis, 2020; Buchem & Hamelmann, 2010; Hanshaw & Hanson, 2018), is typically used when discussing cognitive load and refers to creating smaller or shorter amounts of information and learning (Lee et al., 2013; Miller, 1956). These smaller chunks of learning support knowledge acquisition by removing the extraneous content and activities, focusing

learners on the most important aspects (York, 2013), and grouping like content together to help learners scaffold the content and integrate it into their existing schema (Adcock, 2013; Lee et al., 2013).

Breadth of Knowledge

The breadth of knowledge refers to the amount of knowledge, typically indicating a lot, without necessarily having a deep understanding of the knowledge (Webb, 2012). Furman (2017) calls breadth of knowledge the "mile wide, inch deep" (p. 32) scenario, where one knows a lot of information but has surface-level knowledge of those items. When the breadth of knowledge is needed, such as in introductory courses or Google searches for quick information, microlearning is optimal due to its short length, ability to chunk with other like content, and easier connection to prior knowledge (Buchem & Hamelmann, 2010; Dingler et al., 2017).

Application

Application of knowledge is the practice of implementing learning (Molenda, 2013). Within application of knowledge, three instances occur with microlearning: (a) microlearning provides opportunities for learning for authentic application and content knowledge (Emerson & Berge, 2018), (b) in spaces where depth of knowledge and skills are needed, microlearning better supports specific skills and knowledge than macrolearning (Polasek & Javorcik, 2019), and (c) microlearning supports learners' learning and application of new knowledge quickly (So et al., 2020).

Authentic Application

Authentic application of knowledge involves demonstrating skills in real-life situations or settings (Zheng & Sang, 2013). Microlearning can support authentic application and just-in-time tasks similarly to job aids but moves beyond immediate assistance to upskilling and reskilling, especially in workplace settings (Hogle, 2021). Upskilling is when someone refines their current skills, and reskilling is when someone learns something new (Degreed + Harvard Business Publishing, 2019; Hogle, 2021). In both upskilling and reskilling, authentic application is needed through focused and purposeful resources (Degreed + Harvard Business Publishing, 2019). Microlearning can be used for these focused and purposeful resources, ensuring application in an authentic manner is included.

Depth of Knowledge and Skills

Depth of knowledge refers to the connections and extent of knowledge on a topic (Webb, 2012). Microlearning supports specific skill acquisition in both just-in-time and mastery senses (King, 2021). In application, mastery of skills is regularly connected to competency. Microlearning has been connected to competency-based learning, which focuses on applying learned knowledge, skills, and/or attitudes to showcase proficiency in a topic (Emerson & Berge, 2018; Zhang & West, 2020). Although competency and depth of knowledge are regularly coupled with time (Webb, 2012), microlearning research suggests that skills can be learned for immediate and continued application and transfer in shorter chunks of learning (Hamilton et al., 2021; Hogle, 2021; King, 2021).

Learn and Apply Quickly

Microlearning supports just-in-time learning and new knowledge when needed quickly (King, 2021; So et al., 2020). Learners want to find information quickly and have their specific learning needs met (Hamilton et al., 2021; Hogle, 2021; So et al., 2020). This personalization of learning and access to various topics is being designed in microlearning platforms that enable subscription or pulled approaches that are learner-centered (see Hamilton et al., 2021; Hogle, 2021; Zhang & West, 2020). Microlearning can support learners in their application of learning by providing short resources that, when designed well, can be effective and allow learners to apply their knowledge in a short-time format (Tufan, 2021).

Design

We also follow the assumption that design impacts the gain of knowledge. We provide recommendations that support designing learning in micro in two categories: microlearning design and the learning environment.

Microlearning Design

The design of microlearning moves beyond chunking and reducing content to the specific design considerations to support learning in micro (Tufan, 2021). Within microlearning design, two instances occur: (a) microlearning designed with cognition elements and researched multimedia principles will better support knowledge acquisition (Tufan, 2021), and (b) microlearning designed with reflective practices and hands-on opportunities will better support knowledge application (Emerson & Berge, 2018).

Design with Research-Based Guidelines

Building new knowledge on previous schemas will be better supported if microlearning is designed with cognition elements such as cognitive load theory (Sweller et al., 1998) and researched multimedia principles such as Mayer's (2017) cognitive theory of multimedia learning (Tufan, 2021). As previously argued, knowledge acquisition is better supported with shorter learning that is more focused, removing the learner's extraneous load (Sweller et al., 1998). Coupling this with researched multimedia principles supports the design of learning that increases essential and germane load while reducing the extraneous load (Clark & Mayer, 2016; Mavilidi & Zhong, 2019; Sweller et al., 2019). By designing microlearning with cognition and researched multimedia principles in mind, learning can be more effective and impactful (Tufan, 2021).

Include Reflective Practices and Hands-on Opportunities

The inclusion of hands-on frameworks in microlearning design, such as active learning (Brame, 2016), and reflective frameworks like self-regulated learning (Zimmerman, 2002), supports knowledge application with and without competency-based models (Emerson & Berge, 2018). Active learning, which includes hands-on activities and reflective practices, allows the learner to practice by doing (Brame, 2016). Active learning is very important in skill-based or competency-based learning as it supports depth of knowledge for skill-based practices (Polasek & Javorcik, 2019) that support learners' desire to learn quickly (So et al., 2020). Goal setting, self-observation, and self-reflection, which can be used with active learning as reflective practices, support motivation and self-awareness of new learning and connect learning back to personal environments (Ley, 2013; Zimmerman, 2002). Microlearning, when designed with reflective and hands-on practices, can support learners in acquiring and applying new learning.

Learning Environment

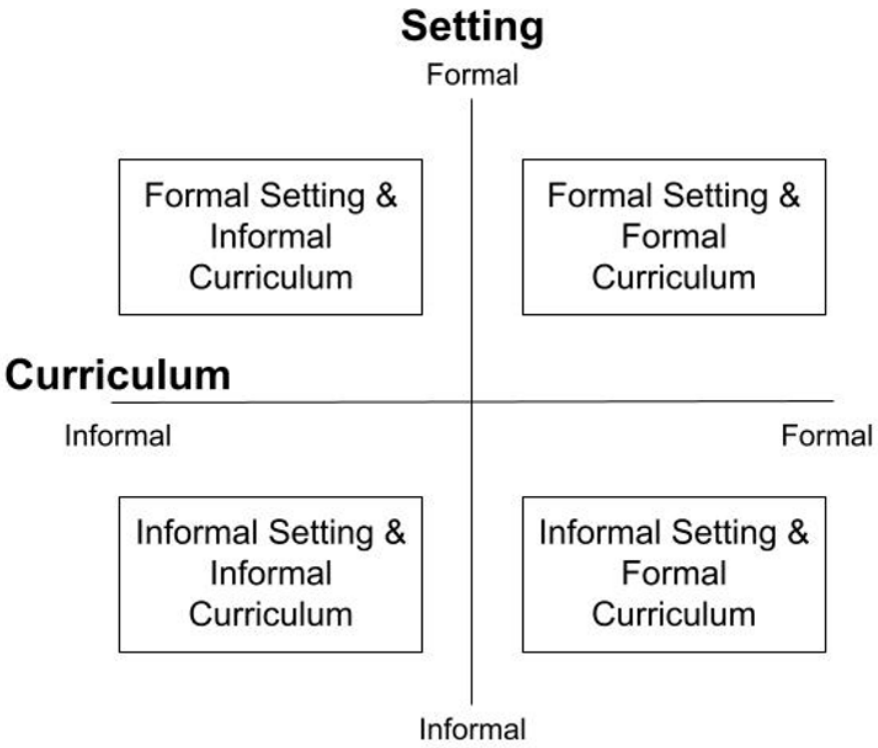
The learning environment includes how the learning is made and delivered (Schwier, 2012); when creating learning, it is considered the most important factor (Marsick & Volpe, 1999; Rosemary & Feldman, 2009). Within the learning environment, two instances occur: (a) microlearning should be specifically designed for formal or informal learning and (b) microlearning designed for informal learning environments will better support knowledge application than knowledge acquisition (Buchem & Hamelmann, 2010).

Designed for Specific Environments

Learning is on a continuum. In formal learning, the setting and curriculum are structured, typically directed by a teacher or facilitator. In informal learning, the setting and curriculum are learner-directed (see Figure 3; Sefton-Green, 2004). Informal learning models differ from formal learning models as they include specific design considerations for the self-directed, social learner searching for or learning in a non-intentional way (see Gu et al., 2014; Manuti et al., 2015; Martinez & Whiting, 2020). The use of microlearning designed for formal environments will be less effective in knowledge acquisition and/or application in informal environments (Emerson & Berge, 2018). When designing microlearning, the specific environment in which the learning will take place should be considered because formal, non-formal, and informal learning has different considerations during design.

Figure 3

Continuum of Informal and Formal Learning



Note: Adapted from "Designing Informal Learning Environments," by S. A. Martinez and J. N. Whiting, in J. K. McDonald and R. E. West (Eds.), *Design for learning: Principles, processes, and praxis* (p. 2), 2020, EdTech Books. https://edtechbooks.org/id/designing_informal. CC BY-NC.

Informal Learning Environments

Microlearning and informal learning have been connected in the literature (see Boileau, 2018; de Vries & Brall, 2008; Martinez & Whiting, 2020), but few studies have considered informal microlearning design (see Bal et al., 2023; Buchem & Hamelmann, 2010). In informal learning environments, networking and collaboration within communities occur; thus, microlearning is ideal for quick sharing of information and skills (Buchem & Hamelmann, 2010). Informal microlearning resources include videos, infographics, and internet searches (Kasenberg, n.d.; King, 2021), with the most popular being videos (Czyz, 2017). Within these resources, there is a large focus on upskilling and reskilling, especially in workplace settings (Hogle, 2021). The focus on skills in informal learning literature and the connections of informal learning and microlearning suggest that informal microlearning will better support the application of knowledge based on the direct, short content provided through the popular video format.

AECT Connection

The theory of learning in micro is in direct alignment with the Association for Educational Communications & Technology's (AECT) mission of "promoting scholarship and best practices in the creation, use, and management of technologies for effective teaching and learning" (AECT, n.d., para. 4). As a leader in educational technology research and best practices, AECT is in a position to help shape the future of research on microlearning by encouraging members to engage in scholarly work in this area, and ultimately, by paving the way for Learning Design and Technology researchers to connect the existing practice with theory. Through our initial theory, we hope to exemplify the values of

leadership and collaboration as we work together to establish a foundation for how people learn in micro. Further, advancing knowledge and design related to microlearning demonstrates a commitment to producing high-quality artifacts, a component of the AECT value of professional standards.

Why Use this Theory

Microlearning has been around since 2002, but even with 20 years of use, it is still considered an emerging instructional design trend (Hug, 2007; Madden & Govender, 2020). Although microlearning is used in various contexts and environments, the definition and design elements vary. A few microlearning frameworks and models exist in the literature (see Alqurashi, 2017; Dolasinski & Reynolds, 2020; Hug, 2007; Kasenberg, n.d.). These frameworks and models support practitioners' use of microlearning. However, additional research is needed to provide context and explanation and robust theoretical perspectives that can be tested and challenged. In summary, our proposed *theory of learning in micro* aims to provide a set of beliefs and assumptions to the microlearning community to be used by Learning Design and Technology researchers as further frameworks and models are developed.

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Understanding Empathy in Instructional Design

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Instructional Designers | Digital Education | empathic design | empathic forecasting | temporal dimension

Empathy, the ability to vicariously imagine, understand, and emote another's perspective, has become an increasingly critical soft skill for instructional designers. However, theories about how instructional designers build empathy with users remain scarce. This article aims to trace the theoretical roots of empathy in instructional design practices and establish a solid understanding of empathy and empathic design in this setting.

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Introduction

Harper Lee (1960), Pulitzer prize-winning American novelist, once said, “You never really understand a person until you consider things from his point of view … Until you climb inside of his skin and walk around in it.” This is the definition of empathy, despite its loose interpretation of the cognitive process. Empathy is the skill that allows us to react emotionally when confronted with the needs of others (Wilhelm & Bekkers, 2010). Empathy is a basic component of life and a basic component of social behavior, guiding the way in which we work together cooperatively and navigate challenges individually (Briggs, 2014; Fleming & Lovat, 2015).

The outbreak of the COVID-19 pandemic has resulted in a new wave of online education accompanying an increasing demand for efficient instructional designers to rapidly convert courses into online offerings. Particularly in such an era of uncertainty, empathy between instructional designers and learners becomes critical for improving online learning effectiveness. Emoting from learners’ perspectives becomes an urgently needed competence for instructional designers. However, a sound understanding of empathy in learning design and technology settings is absent. Beyond understanding how empathy functions in instructional design, providing instructional strategies and guidelines for instructional design professionals to integrate empathy in their works is also necessary.

Therefore, the purpose of this article is to tap into the theoretical roots of empathic design and develop an understanding of empathy in learning design and technology settings. The following sections start with an overview of empathy and its components, followed by a review of empathy in instructional design settings. The remaining sections center on the discussion of strategies for fostering empathic designers.

Empathy

Empathy is a basic component of both longitudinal success and social behavior, guiding the way in which we function as a global culture (Briggs, 2014). The modern idea of empathy originated in the late nineteenth and early twentieth centuries, the product of a German term, *Einfuhlung* (Cuff et al., 2016). This phrase, coined by Robert Vischer, commonly applied to art and the aesthetic experience (Ganczarek et al., 2018). It came to be translated as “feeling into”, denoting a projection of emotion beyond the self (Decety & Lamm, 2006; Goldie, 1999). This projection could be extended to human and nonhuman entities alike. For example, allowing connoisseurs of impressionism to fully appreciate the emotional connotations of exhibited work (Ganczarek et al., 2018). Within the parameters of social and behavioral science, empathy is typically considered the neural process of perceiving the emotional state of another and imagining a personal response based on that specific point of view (Goldie, 1999; Riess, 2017).

There is a consensus that empathy encompasses two aspects: cognitive empathy, which involves one’s ability to construct a working model of others’ emotional states, and affective empathy, which entails one’s capacity of vicariously experiencing the feeling of others (Cuff et al., 2016; Lucas-Molina et al., 2018; Reniers et al., 2011). Both cognitive empathy and affective empathy can exist separately; however, it is the handling and placement of cognitive elements that produces the affective elements (Cuff et al., 2016; Lucas-Molina et al., 2018).

Empathy in Instructional Design

Empathy, defined as one’s ability to understand others’ perspectives and emotionally connect with them (Carmel-Gilfilen & Portillo, 2016), has become an increasingly critical soft skill for instructional designers. To build empathy with users, instructional designers apply empathic forecasting to predict users’ cognitive and emotional reactions. Tracey and Hutchinson (2019) described that empathic forecasting occurs via “projecting goals in the future” and “emoting a vision of the future” (p. 1266). Specifically, projecting goals in the future allows instructional designers to envision various possible design options via imaging emotional and cognitive reactions towards each option of design through a learner’s perspective (Hellström & Hellström, 2003). Instructional designers then verbally prototype and/or visually model the initial design based on the simulated learner experience (Kouprie & Visser, 2009; Tracey & Baaki, 2022). They

then refine the design in line with learner competence and preference. Additionally, emoting a vision of the future mainly focuses on developing an emotional resonance with learners (Wilson & Gilbert, 2005). Instructional designers begin by anticipating learners' concerns about interacting with the design and making informed revisions based on those predictions. They then predict the learners' level of comfort in navigating the revised design until they envision the learners feeling excited about the new design, which prompts them to use that version (Tracey & Hutchinson, 2019; Wilson & Gilbert, 2005).

Tracey and Hutchinson (2019) offered valuable insights into the temporal perspective of empathic design in digital education and suggested practical implications for enhancing the proficiency of instructional designers. A particularly important component of empathic design practices in instructional design settings is to combine the past (e.g., identify problems and the initial solution), the present (e.g., explore solutions), and the future (e.g., devise creative solutions) in a design (Kouprie & Visser, 2009). A temporal perspective of empathic design involves constant interplay between projection and reflection to devise the solutions that resonate with learner needs (Hellström & Hellström, 2003; Tracey & Hutchinson, 2019). Instructional designers project themselves through the learners' perspective and make assumptions about their cognitive and emotional reactions. Having a comprehensive understanding of learner characteristics and other contextual factors in a design problem (i.e., the past in design) is critical for instructional designers to build empathy with learners. When projecting goals into the future, instructional designers analyze how their empathic forecasting predicted the learner's experience. Specifically, instructional designers reflect upon an understanding of design problems and learner characteristics to explore the disparities between design prototypes and expected learner reactions. It is worthwhile to note that a temporal perspective of emotions posits that emotions change as learners react to contextual factors (Tang et al., 2018, 2019). Thus, instructional designers should simulate the emotional reactions in a dynamic manner rather than as an emotional status at a static point. Moreover, emoting a vision of the future combines instructional designers' understanding of "the present" and "the future" in design. By exploring the prototypes in learners' shoes (i.e., developing an understanding of the present), instructional designers seek to understand learners' affective perception and build an emotional resonance with them on the future design. In short, fostering instructional designers' competence of adopting a temporal perspective of empathic design is critical to enable them to build empathy with learners.

Furthermore, understanding the interplay between instructional designers' affective forecasting and empathic forecasting is important (Arditte Hall et al., 2018). Affective forecasting describes instructional designers' self-prediction of their own emotional reactions to a specific incident (Wilson & Gilbert, 2005). With empathic forecasting, instructional designers can adopt a learner's perspective to envision their emotions. Affective forecasting and empathic forecasting interplay when instructional designers attempt to build empathy with learners. In Kouprie and Visser's (2009) four-step empathic design model, instructional designers a) discover, b) immerse, and c) connect to learners' perspective, then d) detach from the imagined learners' situation and return to the role of instructional designers. Dissolving affective and empathic forecasting is necessary for instructional designers to precisely envision others' emotions and perspectives, thus devising efficient solutions.

Developing Empathic Designers

During the outbreak of the COVID-19 pandemic, many universities and schools chose to move all their courses online as a stop-gap method in response to campus closure. This abrupt change in course delivery format resulted in a significant demand for instructional designers to help efficiently convert the course online in a short time frame. Today, besides converting courses into their online alternatives, instructional designers are expected to understand the learners (e.g., the learners' preferences and challenges) and then emote from learners' standpoint to deliver effective instructional design products. Empathy is important for each phase of instructional design (Tracey & Hutchinson, 2019). Therefore, adding empathy as a key competence for graduates from instructional design degree programs is urgently needed. The rest of this section reviews several teaching strategies that may foster instructional design students' competence of developing empathy with their audiences and contexts, specifically, design thinking, experiential learning, and real-world problem solving.

Design Thinking

Design thinking is an approach to developing design projects/products in a five-phase process including empathy, definition, ideation, prototyping, and testing (Pande & Bharathi, 2020). By undertaking the process of empathizing, students can build empathy with customers and also teammates and understand the purpose of the design (Yu et al., 2019). During the process of definition development, students need to develop an effective representation of the problem which can further inform the following process of ideation (Gumina & Tang, 2021). Through ideation, students develop potential solutions to address the design problems. Usually, students work in groups to brainstorm various potential solutions and then figure out an appropriately executable one (Li et al., 2019; Wu et al., 2019). Building upon the outcome of the ideation, students produce a prototype that allows them to showcase their preliminary solutions and potential outcomes (Tang et al., 2021; Tsai & Wang, 2021). Once the prototype is generated, an iterative cycle of testing is performed to investigate the efficacy of the prototype and make further revisions based on the test results (Gumina & Tang, 2021; Ladachart et al., 2021; Tsai & Wang, 2021).

Empathy is the foremost step in the design thinking process (Tracey & Baaki, 2022). Accordingly, design thinking has been adopted in educational settings to foster student expertise of devising solutions responsive to the needs of the community and/or the audience (Dawbin et al., 2017; Henriksen et al., 2017; Tsai & Wang, 2021). For instance, Dawbin et al. (2017) found secondary school boys reinforced their empathy over social equity challenges related to supporting women who experienced domestic & family violence after attending a workshop using the design thinking approach. Design thinking explicitly integrates empathy, both cognitive and affective empathy, as a critical component of the design process where designers need to consider the problem from the perspective of the audience for whom the design is intended for (Cook & Bush, 2018; Lin et al., 2020).

Experiential Learning

Experiential learning considers learning to be process-oriented rather than outcome-oriented, especially as learners acquire knowledge by reflecting upon and internalizing their experience (Kolb, 2014). Integrating beyond-the-classroom learning experiences in the curriculum provides an opportunity for instructional design students to (a) encounter new experiences, (b) reflect on the inconsistencies between the experience and their current understanding, (c) generate new ideas, and then (d) apply ideas to solve authentic problems. Nursing educators have integrated experiential learning to improve students' cognitive and affective empathy with patients and their caring-ethics (Ter Beest et al., 2018; Vanlaere et al., 2010). Similarly, working on real-life projects directly relevant to themselves, instructional design students can benefit from beyond-the-classroom learning experiences through consolidating their commitment to their civic growth (e.g., cultural values, senses of identity) and developing connections to their local community (Giordano et al., 2015). Additionally, beyond-the-classroom learning experiences allow instructional design students to align their career aspirations with professional standards. Overall, experiential learning can provide instructional design students with opportunities for connecting learning with authentic needs of their local community and fostering their empathy towards the context and/or the audience.

Real-world Problem Solving

Rogers (1975) postulates that empathy can be developed over time and is to be fostered through authentic experiences. Maiorca et al. (2021) argue that empathy should be fostered through experiences that highlight the application of learning in authentic settings so that students can be aware of the connections between learning and real-world problem solving. Research has investigated whether and how community service-oriented learning experiences fostered student empathy in this setting. For example, Humphreys and Blenkinsop (2018) engaged students in an inquiry-based learning project of exploring a river nearby their community in order to develop students' empathy and ecological identity. Bush and Cook (2019) insisted that empathy is a vehicle for inspiring students to engage in solving authentic problems to "make the world a better place" (p. 49). Edelen et al. (2020) argued that empathy can be key to helping students connect with contexts that may otherwise be distant to them. In short, providing instructional design students with authentic problem-based learning becomes an opportunity to develop students' empathy towards solving real-life problems.

Conclusion

Overall, empathy is a fundamental skill for instructional designers (Humphreys & Blenkinsop, 2018; Korte et al., 2018). Empathy permeates instructional design and is important for each phase of the instructional design process. Therefore, supporting instructional designers as they foster empathic design capacities needs to be prioritized in professional training offered by instructional design programs. Understanding empathy in instructional design practices calls for advancement in its theories. Learning theories and instructional strategies such as design thinking, authentic problem-based learning, and experiential learning can facilitate the development of student empathy (Cook & Bush, 2018; Giordano et al., 2015; Humphreys & Blenkinsop, 2018).

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