Framing *Instructional Strategies* as a Concept in K-12 Digital Learning

Mary F. Rice
University of New Mexico
USA
maryrice@unm.edu

Raymond M. Rose
Texas Digital Learning Association
USA
ray@rose-smith.com

Mark E. Deschaine
University of Mississippi
USA
medescha@olemiss.edu

Abstract: Instruction is distinct from teaching but often conflated, particularly in K-12 digital learning. In this paper, we discuss four ways of framing K-12 digital learning (i.e., individualization, differentiation, personalization, and presence) and discuss the implications for each. We also highlight the challenges of expecting that technological engineering and design will resolve persistent issues with digital instruction. In fact, there are harms in subjecting students, particularly historically underserved populations to constant data draws in the name of instruction.

Introduction

Children who are enrolled in K-12 digital schooling and programming are supposed to receive some access to curriculum in the form of instruction as part of a general opportunity for a Free and Appropriate Education that applies to all students (Swenson & Ryder, 2016). The *instructional strategies* that are used in K-12 digital learning include what a teacher might do or use to present subject matter to students as well as how digital instructional materials might be organized and presented to students to help them learn (Rice & Ortiz, 2021a). Instruction is one responsibility of teaching, but it is not the only responsibility, even for fully online teachers (Pullham & Graham, 2018; Pullham et al., 2018). Moreover, instruction as part of teaching does not automatically cause learning; instead, theories of learning inform how teaching can produce the circumstances with the greatest likelihood for success (Brophy, 1986; Duran, 2017).

Perhaps key to the appeal of K-12 digital learning was that teaching, and the instruction embedded within it, could be controlled and standardized so that directional relationships between teaching and learning could be managed as causal. Embracing ideals of *technochauvanism*, it was hoped that K-12 digital learning programs would be able to resolve these challenges by providing structural aspects like flexibility and choices (Broussard, 2023). Technologies are often touted in educational settings to help individuals with challenges such as disabilities even though materials are inaccessible and not designed for use of such persons (Gebru & Torres, 2024). Instead, the general expectation has been that some general structural differences or minimal shifts in design will meet students' needs (Williams, 2025). K-12 digital learning programs have claimed, and often claimed without evidence, that they do many of the practices recommended by the educational technology vendors and government documents to provide accessible instructional materials, use personalized applications, differentiate, and individualize for those who qualify—children who have been identified with disabilities, children of color, and children living in poorer

households had worse outcomes during the emergency remote learning of the pandemic and in online schools (Ortiz et al., 2020). Yet the small amount of information that has been made available about the achievement and persistence of these students in K-12 digital learning demonstrates that could be less than that of their peers (Friedhoff, 2015). For schools and programs that do well, mentorship from an adult and monitoring are often highlighted as being key to keeping students in the program, yet this requires much labor.

Initial Efforts to Map Strategies of *General "Good Teaching"*

Some of the initial work in online instruction was built on general direct strategy instruction that had been tested in (non)digital learning (Swanson, 2004). Researchers took the kit of strategies that they already had and then, unsurprisingly, found that the *best* instructional model for such students is a combination of direct instruction with strategy instruction—much like learning in-person. The conclusion was that students should be provided direct information about subject matter and be supported in learning strategies for how to comprehend and use that subject matter. Large reviews of online teaching that have included instructional strategy retrieval have also argued that teaching competencies are generally the same regardless of learning modality: blended, online, or technology infused learning (Pullham & Graham, 2018; Pulham et al., 2018). Even though the authors of these reviews were finding *general competencies* there was some future expectation in their work that with more observation, documentation, and exploration, instructional strategies may vary by modality or may vary more based on learner profile. When Crouse et al. (2018) interviewed fully online teachers about their instructional strategies to support students with disabilities, they found that online teachers were attempting and recommending many of the practices already identified for supporting students with learning differences and/or disabilities. Again, this was unsurprising that teachers from in-person learning took their instructional kit, so-to-speak, and applied it online.

The purpose of this article is to outline popular approaches instructional strategies in K-12 digital learning. These include initial work to lift strategies from in-person teaching and instruction as well as to borrow from popular framings. These framings include (1) individualization, (2) differentiation, (3) personalization, and (4) presence. These are elaborated in Table 1.

Table 1. *Frames for Instructional Strategies*

	Antecedents	**Some Associated Scholars**	**Key Features**	**Implications for Instructional Strategies**
Individualization	Mastery learning Objective-driven Learner preferences	Gusky (1997) Slavin (1987) Bloom (1965) Rhode (2009)	Flexibility: -Time -Method -Curriculum Implemented according to stakeholders' plan.	Basis for Individualized Educational program development per IDEA (2004); accommodations and modification allow for individual differences.
Differentiation	Neo-Piagetian readiness Engagement Standards-based assessment	Csikszentmihalyi (2013) Tomlinson (2014) Wiggins (2005)	Options for: -Content -Process -Product Implemented by teachers with instructional planning.	Diminishes the need for accommodations; students are guided through choices of tasks that will help them learn what they are ready to know in relationship to standards.

Personalization	Computerized mastery learning Adapted learning through technology	Frick (1992) Walkington (2013)	Students believe they have choices: -Pace -Path -Place Computer algorithms notice learner behaviors and adjust tasks.	Programs and devices use algorithms to adjust and therefore, they eliminate the need for accommodations and modifications to instruction.
Presence	Pragmatic learning within communities Sociocultural learning Shared cognition and responsibility	Dewey (1997) Glassman (2001) Garrison (2022)	Maintained by -Continuity -Interaction Focus on natural opportunities for learning and growth (some formal, some informal)	Shared responsibility for learning (and potentially shared cognition) within a web of relationships. Community members neglecting their responsibilities has implications for others' access to instruction. Concern for preserving the relationship between students and teachers drives some micro-adjustments to instruction.

Even with this abundance of framing options, instruction is often elusive in K-12 digital learning and attempts to learn about children in granular ways might do more to endanger them than instruct them. Finally, we ask questions that might support the development of supportive practice for instruction that leads to learning in online schools and digital programs. We acknowledge that researchers, practitioners, and policy makers do not speak of these terms using uniform definitions. For example, Burton (2007) traced how the British government toggled between the terms *differentiation* and *personalization* without changing what was meant by the terms.

Individualization

Individualization—is a term from the Individuals with Disabilities in Education Act (IDEA, 2004) which requires that schools track progress, design goals, and identity support for children who qualify under the parameters of this act. Individualized learning per IDEA involves specialized instruction from prepared individuals under the direction of a local educational agency (LEA) in the least restrictive environment. In online learning, LEA could be the school itself, or it could be an overseeing district or some other entity (Ortiz et al., 2020). The least restrictive environment is about access to a general education curriculum and access to peers. Leading up to and since the onset of the COVID-19 pandemic, there were increases in K-12 students in online schools and digital programs who—for various reasons—cannot learn effectively without instructional materials and strategies designed to make the learning environment accessible (Rice & Ortiz, 2021a). Also, Rice (2024) documented parent's descriptions of their efforts in published research studies from across the globe. Concepts such as *access to the internet* and *accessibility* and even *assistive technology* are used interchangeably (Rice & Ortiz, 2021a). While efforts are supposed to be made to achieve accessibility through using specific features built into instructional materials (e.g., text-to-speech, background color changes, and translations), this does not always occur.

Differentiation

Differentiation—a theory advocating the altering of the content, process, or products of learning according to needs or preferences. Ideas about differentiation developed before technologies were widely used and technologies are not required for differentiation. The Universal Design for Learning (UDL; CAST Inc., 2026) is a theory of learning teachers or instructional designers can use to shape instruction by offering strategic choices and opportunities to learners. These choices include multiple pathways for engagement, representation, and action and expression. According the UDL website (see https://udlguidelines.cast.org), the goal of UDL is learner agency, which is essentially a pathway for as much self-differentiation as possible within the design structure of a course. It is important to understand that UDL has undergone multiple revisions over the years. These revisions may have been to match technological developments or calls for funding, ostensibly because technology was deemed an optimal way to efficiently allow multiple ways to differentiate learning (see Rose, 2000 for the original, non-technologically dependent model).

Personalization

Several decades ago, some studies found that students benefited from one-on-one learning opportunities (Swenson, 2004). Even though studies were not about K-12 digital learning schools and programs, findings from such studies have been cited to justify what has been termed *personalized* learning applications. Personalization is a term developed within educational technology communities to communicate the use of algorithms—perhaps within a machine learning context—to determine what tasks to present to children, next (Arnesen et al., 2019). Personalized learning applications use algorithms to continually assign additional tasks to K-12 learners, under the assumption that most, if not all instructional tasks can be divided and sequenced. More recent research has pointed out how algorithms that personalize learning create cycles where children must use technologies in a continual loop (Boninger et al., 2019). Technochauvinist principles argue that more data is always better and/or better interpretation of it will universally lead to better outcomes (Broussard, 2023). Giving more granular information to data collection systems might not improve instruction and it might do genuine harm to students. For example, identities such as having a disability or being multilingual are not neutral identities in the current social and political climate. Such identities could lead to rejections from some online schools and digital programs—even though that is technically against federal laws and statutes in states (Rice & Ortiz, 2021b). However, information that students give about their families, the holidays they search, the entertainment topics, and other items might also be flagged and shared with law enforcement (Nichols & Monea, 2022). Personalized materials based on algorithmic recommendations might not show students all the lessons or the lessons for their grade (Katz et al., 2022). Even with these concerns, *personalized learning* advocates ensured that it was added to government documents and recommendations for all children with little discussion about potential limitations, pitfalls, or the ideological concerns.

Presence

In teaching and learning, *presence* refers to a mental state of being aware of and accepting responsibility for one's own learning while caring about the learning of others while actively pursuing inquiry (Dewey, 1997). Teachers who are engaged in a state of presence are said to be engaged in processes of listening, thinking, reflecting, and responding to students that is sociocultural in nature (Glassman, 2001). Presence requires more commitment to sharing intellectual space with students. Garrison (2022) elaborated an earlier theory of presences (e.g., cognitive, teaching, social, learning) to include the idea that learners could actively take responsibility for one another's learning as a community online. In addition, presence as a frame for instruction requires more than merely using the same materials at the same grade level or seeing each other's work–maybe with an opportunity to comment. It also is more than the ability to self-differentiate, although there might be some similar democratic processes around agencies. While discussions about sociocultural learning where instructors have presence with students and foster it are more common in higher education, there has been some interest in describing instructional patterns undergirded by presence in K-12. For example, Hrastinski et al. (2023) mapped online math tutoring for K-12 students and found

that students wanted to stay in explorational patterns with math longer than teachers anticipated and the technological tools at their disposal were insufficient to push them to integrating their knowledge. Rather than allow the expectations and technologies dictate the math trajectory, the teachers allowed the students to linger and worked to find authentic means from their experiences to interest them in moving forward.

The Purpose Instruction is What it Does

In systems evaluation an analytical tool called "The Purpose of a System is What it Does" (POSWID; Cabrera & Cabrera, 2020) has been used to simplify understandings about what technologies do and whom they serve. If instruction in an online schools and digital programs is part of a system of low achievement, low persistence, low graduations–that is its purpose. For example, Pulham and Graham (2018) discussed with much hope the dynamic nature of digital materials. So-called dynamic materials are supposed to provide instructional strategy flexibility through adaptive, interactive or personalized learning opportunities. These materials must be designed by an engineer and/or an instructional designer. These dynamic materials have been around long enough now that we can see if they if they help and who they help. The answer to the question, *what do they do?* is their purpose. Future instruction will probably be provided increasingly with forms of artificial intelligence (AI), specifically generative AI, including large language models and chatbots. Given the previous discussion from the article about various frames for instruction, it seems that the personalization frame will be most often cited. If that is true, then it will be important to avoid the Disability Diversion (Williams, 2025), where a primary argument is made for adopting a technology around serving individuals with identified with a disability while harms from the technology are never or rarely anticipated, evaluated, investigated, or mitigated for such individuals. Also, Rice and Dunn (2023) asked about the social positioning of disability as an irksome condition and the use of AI to avoid meaningful interaction about needs and services.

Future Research on Instructional Strategies

Below are some ideas about research and practice focused on improving the purpose of instruction by focusing on what it does and for whom.

T*erm Clarity with a Goal of Instruction and Learning.* There is an opportunity for research that considers the benefits and drawbacks to various frames for instruction in online schools and digital programs (i.e., individualization, differentiation, personalization, presence) when working with students and/or preparing teachers. We do not think we need new terms or even to have extended conversations about terms at the expense of conversations about the instruction and learning itself. What is important is that researchers, practitioners, and policy makers speak clearly about what they mean when they use a term and that they do not expect that these are 100 percent interchangeable to everyone even if there is also some conceptual overlap.

Refusal of Disability Diversion. Second, the drive for increasing amounts of data for students have been driven by a claim that advanced technologies will help students who have historically been underserved in schools, especially students who have been identified in schools. Yet, we have yet to see expansive evidence of learning and achievement for these students. Instead, there seems to be a greater possibility that data will be used to surveil and remove choices of courses and opportunities from students. We recommend thinking about K-12 digital learning schools and programs can avoid the problems with Disability Diversion when trying to access new technologies for instruction?

References

Arnesen, K. T., Graham, C. R., Short, C. R., & Archibald, D. (2019). Experiences with personalized learning in a blended teaching course for preservice teachers. *Journal of Online Learning Research*, *5*(3), 275-310. https://www.learntechlib.org/p/210637/

Bloom, B. (1965). *Taxonomy of education objectives: The classification of educational goals.* David McKay.

Boninger, F., Molnar, A., & Saldaña, C. (2019). *Personalized learning and the digital privatization of curriculum and teaching*. National Education Policy Center. http://nepc.colorado.edu/publication/personalized-learning

Brophy, J. (1986). Teacher effects research and teacher quality. *The Journal of Classroom Interaction*, *22*(1), 14-23.

Broussard, M. (2023). *More than a glitch: Confronting race, gender, and ability bias in tech*. MIT Press.

Burton, D. (2007). Psycho-pedagogy and personalised learning. *Journal of Education for Teaching, 33*(1), 5-17. https://doi.org/10.1080/02607 47060 1098245

Cabrera, D., & Cabrera, L. (2020). *The purpose of a system is what it does*. Cabrera lab: Adapt and thrive. https://www.cabreralab.science/post/the-purpose-of-a-system-is-what-it-does

CAST, Inc. (2026). *CAST: Until learning has no limits*. https://www.cast.org/

Crouse, T. & Rice, M. (2018). Learning to serve students with disabilities online: Teachers' perspectives. *Journal of Online Learning Research*, *4*(2), 123-145.

Csikszentmihalyi, M. (2013). *Flow: The psychology of happiness*. Random House

Dewey, J. (1997). *Experience and education*. Free press.

Duran, D. (2017). Learning-by-teaching. Evidence and implications as a pedagogical mechanism. *Innovations in Education and Teaching International*, *54*(5), 476-484.

Freidhoff, J. (2015). *Michigan's K-12 virtual learning effectiveness report, 2013-14.* Michigan Virtual Learning Research Institute. https://michiganvirtual.org/about/news/michigans-k-12-virtual-learning-effectiveness-report-2013-14/

Frick, T. (1992). Computerized adaptive mastery tests as expert systems. *Journal of Educational Computing Research*, *8*(2), 187-213. https://doi.org/10.2190/J87V-6VWP-52G7-L4XX

Garrison, D. R. (2022). Shared metacognition in a community of inquiry. *Online Learning*, *26*(1), 6-18. https://doi.org/10.24059/olj.v26i1.3023

Gebru, T. & Torres, É. (2024). The TESCREAL bundle: Eugenics and the promise of utopia through artificial intelligence. *First Monday*. https://doi.org/10.5210/fm.v29i4.13636

Glassman, M. (2001). Dewey and Vygotsky: Society, experience, and inquiry in educational practice. *Educational Researcher*, *30*(4), 3-14. https://doi.org/10.3102/0013189X030004003

Gusky, T. (1997). *Implementing master learning.* Wadsworth.

Hrastinski, S., Stenbom, S., Saqr, M., Jansson, M., & Viberg, O. (2023). Examining the development of K-12 students' cognitive presence over time: The case of online mathematics tutoring. *Online Learning, 27*(3), 252-271. https://doi.org/10.24059/olj.v27i3.3481

Individuals with Disabilities Education Act (IDEA), 20 USC. Chapt. 33, Pub. L. 91–230 (2004)

Katz, D., Huggins-Manley, A., & Leite, W. (2022). Personalized online learning, test fairness, and educational measurement: Considering differential content exposure prior to a high stakes end of course exam. *Applied Measurement in Education*, *35*(1), 1-16. https://doi.org/10.1080/08957347.2022.2034824

Nichols, T. P., & Monea, A. (2022). De-escalating 'dataveillance'in schools. *Phi Delta Kappan*, *104*(4), 23-27. https://doi.org/10.1177/003172172211429

Ortiz, K., Mellard, D., Deschaine, M., Rice, M., & Lancaster, S. (2020). Providing special education services in fully online statewide virtual schools: A policy scan. *Journal of Special Education Leadership*, *33*(1), 3-13.

Ortiz, K., Rice, M., Curry, T., Mellard, D., & Kennedy, K. (2021). Parent perceptions of online school support for children with disabilities. *American Journal of Distance Education*, *35*(4), 276-292. https://doi.org/10.1080/08923647.2021.1979343

Pulham, E. & Graham, C. (2018). Comparing K-12 online and blended teaching competencies: A literature review. *Distance Education, 39*(3), 411-432. https://doi.org/10.1080/01587919.2018.1476840

Pulham, E. Graham, C., & Short, C. (2018). Generic vs. modality-specific competencies for K-12 online and blended teaching. *Journal of Online Learning Research*, *4*(1), 33-52. https://www.learntechlib.org/p/182168/

Rhode, J. (2009). Interaction equivalency in self-paced online learning environments: An exploration of learner preferences. *The International Review of Research in Open and Distributed Learning*, *10*(1). https://doi.org/10.19173/irrodl.v10i1.603

Rice, M. (2024). Diffractive perspectives on parents' role in inclusive online, distance, and digital education. *Computers in the Schools*, *41*(2), 145-163. https://doi.org/10.1080/07380569.2024.2325433

Rice, M., & Dunn, S. (2023). The use of artificial intelligence with students with identified disabilities: A systematic review with critique. *Computers in the Schools*, *40*(4), 370-390. https://doi.org/10.1080/07380569.2023.2244935

Rice, M., & Ortiz, K. (2021b). Parents' use of digital literacies to support their children with disabilities in online learning environments. *Online Learning*, *25*(3), 208-229. https://doi.org/10.24059/olj.v25i3.2407

Rose, D. (2000). Universal design for learning. *Journal of Special Education Technology*, *15*(4), 47-51. https://doi.org/10.1177/016264340001500407

Slavin, R. (1987). Mastery learning reconsidered. *Review of Educational Research*, *57*(2), 175-213. https://doi.org/10.3102/00346543057002175

Swanson, H. L. (2004). Searching for the best model for instructing students with learning disabilities. *Special Educational Needs and Inclusive Education: Effective Practices*, *4*(2), 337-261.

Swenson, S., & Ryder, R. (2016). *Dear colleague: Virtual schools*. Department of Education Office of Special Education and Rehabilitative Services. https://sites.ed.gov/idea/files/dcl-virtual-schools-08-05-2016.pdf

Tomlinson, C. (2014). *The differentiated classroom: Responding to the needs of all learners*. Association for Supervision and Curriculum Development.

Walkington, C. (2013). Using adaptive learning technologies to personalize instruction to student interests: The impact of relevant contexts on performance and learning outcomes. *Journal of Educational Psychology*, *105*(4), 932-945. https://doi.org/10.1037/a0031882

Wiggins, G. (2005). *Understanding by design.* Association for Supervision and Curriculum Development.

Williams, R. (2025). *Disabling intelligences: Legacies of eugenics and how we are wrong about AI.* Palgrave Macmillan.