



CAST Case Study:

Showcasing UDL Implementation Success with BCSC

October 2024

Table of Contents

1	Acknowledgements
2	Executive Summary
4	Background
6	Methods
7	Data Sources & Analysis
8	Findings
13	Conclusion
14	References



Acknowledgements

CAST is grateful for the collaboration, data analysis, and research design support of our colleagues at the Indiana University's Institute on Disability and Community, Center on Education and Lifelong Learning: Dr. Sandi Cole, Dr. Hardy Murphy, and Ms. Hannah Bolte. CAST would also like to thank the current and former leadership team at Bartholomew Consolidated School Corporation (BCSC), as well as current and former educators in BCSC, for their time and participation in this research. Finally, CAST would like to acknowledge all of the participants in this research project, who shared their stories and insights with the research team during the course of the study. These contributions were invaluable in developing this case study, and in sharing the impact and potential of Universal Design for Learning.

Executive Summary

Universal Design for Learning (UDL) is a framework designed to optimize teaching and learning for every learner (CAST, 2024). Based on insights from Universal Design in architecture (Story et al., 1996), which posits that environments should be designed to be usable, navigable, and welcoming for the broadest ranges of users, UDL focuses on removing barriers to design inclusive curricular goals, assessments, materials, and methods, so that every individual can thrive. Furthermore, it rejects the notion of an “average” learner around which curriculum should be designed. Instead, UDL recognizes human variability as the norm, and that the existence of barriers in learning experiences and environments can interfere with meeting learning goals (Gordon, 2024).

Developed by researchers at CAST more than two decades ago, the UDL framework is embraced by educators in diverse learning spaces across the globe. In the United States, UDL is endorsed in federal educational policy (e.g., the Every Student Succeeds Act, the Higher Education Opportunity Act); and has been widely adopted in various contexts, including P-12 schools, institutions of higher education, and workforce settings.

As UDL has gained momentum, there has been a growing interest in understanding both its impact and efficacy in improving the experiences and outcomes of teachers and learners. Researchers have explored UDL widely in the literature, and it has been the subject of empirical studies in literacy (e.g., Coyne et al., 2012); science, technology, engineering, and math (STEM; e.g., Rappolt-Schlichtmann et al., 2013); and teacher education (e.g., Fornauf et al., 2023). It has also been the subject of multiple systematic reviews (e.g., King-Sears et al., 2023; Zhang et al., 2024), and descriptive and conceptual analyses (e.g., Griful-Freixenet et al., 2021; Scott & Temple, 2017). The field’s

commitment to UDL is exemplified by this broad research base, as well as by practitioners in states, districts, and schools who continue to center UDL as not only part of their instructional practice, but as part of their leadership and management, professional learning, and school culture and environment.

To contribute to this growing body of work, we offer the current case study. This is the story of one district’s journey of UDL implementation over the course of more than two decades. Researchers at CAST, in collaboration with educators from the Bartholomew Consolidated School Corporation (BCSC) in Columbus, IN and researchers from Indiana University (IU), designed a mixed methods case study to explore the phenomena of sustained, organizational change across BCSC through the implementation of UDL.

Within this study, we present how a vision of inclusive education and high quality learning opportunities for all students evolved into a case of iterative, sustained UDL implementation that continues today. In doing so, we share perspectives from district personnel, including teachers and administrators, as well as UDL experts who have supported the district's work.

The purpose of this study was to tell the story of iterative UDL implementation over time, analyze its impact on students and educators, and identify key drivers that allowed BCSC to continue the successful implementation of UDL. In doing so, we wished to identify not

only the success of the district, but to shed light on the nuanced and complex process of UDL implementation across a broad system. This involved gathering accounts of implementation from members of the district community and beyond, and analyzing how their challenges and lessons learned might be instructive for other districts seeking to implement UDL in service of sustained, organizational change. Further, we hope that the findings of this case study are useful for researchers and practitioners eager to understand the potential of UDL implementation, and explore its efficacy in improving processes and outcomes for every learner.



Our overarching research question asked, “how has one district’s implementation of UDL served as a lever for sustained organizational change?”



Background

BCSC is a school district in southeastern Indiana, with approximately 11,700 students. Based in Columbus, Indiana, a small city with a rich architectural history, BCSC has historically had a strong relationship with the surrounding community. The strong presence of Cummins, Inc. headquarters attracts employees and their families from around the world, resulting in a student population that speaks over 60 different languages.

Leaders within BCSC began exploring UDL as an instructional framework more than two decades ago, as a way to meet the needs of all of their students (Van Horn et al., 2023). Clearly identifying the need for change was key. Like many schools, BCSC had areas where they were operating in silos. Administrators recognized that having a common vision of improving teaching and learning for every learner was crucial. This recognition compelled them to consider how they might adopt a common, overarching framework for teaching and learning that would span disciplines and grades; UDL provided this framework for the district. Dr. George Van Horn, the district's Director of Special Education from 2001-2023, was one of BCSC's first UDL champions, and his leadership within the district, and collaboration with other administrators, has facilitated long-term implementation.

As Director of Special Education, Van Horn was committed to making BCSC - which was considered an inclusive district for students with disabilities - a place where every student could be successful and have options for learning. He began this work by bringing teams from across the district together to think about placement, materials, and content. Eventually, Van Horn learned about UDL through the PATINS Project. PATINS is an Indiana-based technical assistance

center that supports schools to create accessible, equitable learning environments. BCSC applied for and received funding to support a book study of David Rose and Anne Meyer's *Teaching Every Student in the Digital Age* (Rose & Meyer, 2002), which outlined the UDL framework and principles. Van Horn also had an opportunity to meet CAST co-founder David Rose and hear him speak about UDL. Van Horn reflected that while he had not heard the term UDL until his work in BCSC, the ideas at the core of the framework were ones that had long resonated. "When I started to learn about UDL as a framework, it wasn't really about special ed kids, gifted kids, regular ed kids, these kinds of kids. It was about taking into consideration, giving kids lots of options and choices. So it just fit with my belief system."

Van Horn continued to forge a relationship with CAST co-founders David Rose and Grace Meo, and eventually became a member of the CAST Cadre (now known as the National Faculty), through which he connected with other emerging UDL leaders across the country. He and other BCSC leaders also attended summer institutes at the Harvard Graduate School of Education (HGSE), where he had the opportunity to learn with colleagues, analyze data, and continue learning about UDL.

As BCSC's relationship and collaboration with CAST and UDL leaders in the field continued to grow, so did BCSC's commitment to UDL. As Van Horn reflected on the journey he explained, "What we said to folks is, we're doing random acts of improvement. We're using research-based practices. We're doing this, we're doing that, but we're not...organizing it." UDL offered BCSC a way to prioritize, organize, and align these "random acts" into a cohesive approach to success and achievement for every learner.

BCSC began developing a model of professional learning for their district that would inform the growth and learning of CAST's in-house professional learning. The relationship between BCSC and CAST is significant in how it has supported the growth and learning about UDL implementation. According to Van Horn, this was reflected in the establishment of a community of UDL champions from across the country. Facilitated by CAST, this community offered BCSC the opportunity to seek feedback on their scaling of UDL as they continued to iterate. "I always went back to them for advice and help," he said. "And they [CAST] started to come to us for advice and help because they were saying, 'no other school district is doing this...you are the only school district in the world that is, has actually adopted UDL as a framework and is sticking with it and is trying to do it.'"

As UDL implementation continued to grow across schools, so too did embedded systems of support for educators. These included training UDL teams at each school across the district, the creation of a full-time, district-wide UDL Coordinator position, and, with the support of the teachers' union, developing a new teacher evaluation rubric, half of which focuses on

UDL. Bill Jenson, BCSC's former Director of Secondary Education and another early UDL champion, highlighted the significance of this decision, and its impact as a driving force in district-wide implementation. "The big shift didn't come until we put [UDL in teacher evaluation]. We changed the whole evaluation system and that was the key to me. I always go back and think, that was the key driver."

Ten years into its UDL implementation, BCSC began hosting its own UDL Summer Institute, which evolved into a multi-day event that includes prominent keynote speakers from the UDL community, presentations and workshops from BCSC staff, and "fireside chats" where practitioners can discuss nuances and extensions of UDL in their context. The Summer Institutes have also been a key lever in building internal capacity. "What has happened is we used to bring in all these experts you know to come and present and talk about UDL and such. But I think we've given people the green light now, to 'you can become experts too,'" recalled BCSC UDL Coordinator Tina Greene. "You know a lot of the teachers will learn about things maybe in a professional development session, but then a lot of them take it themselves to the next level."



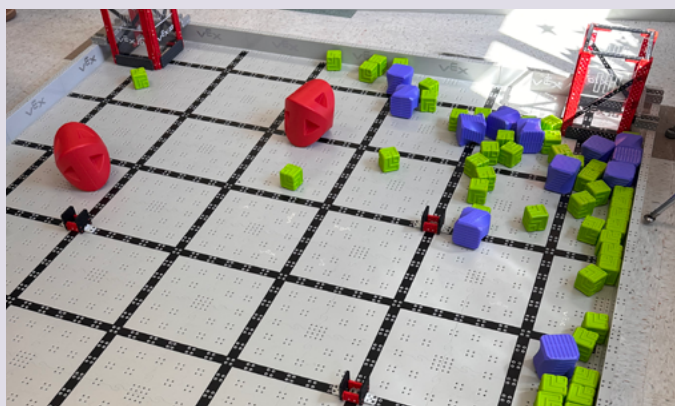
CAST, a leader in UDL research and development, continues to listen to and learn from the field, and explore the different ways UDL is implemented across diverse contexts. BCSC is a leader in the field for implementation of UDL. The district's continued use of UDL as an overarching framework for teaching and learning has supported the evolution of UDL research, professional learning for teachers, and expanded the potential of what is possible when districts iteratively and sustainably commit to implementation. This reciprocal, learning relationship has strengthened both entities on how UDL can support learning for all students.

Now at the beginning of its third decade of UDL implementation, the BCSC team continues to reflect, iterate, and evolve. Recent years have seen the retirement of both Van Horn and Jenson, along with other prominent district leaders and UDL champions. Yet those who remain in the district, as well as friends from the broader UDL community are confident in UDL's sustainability and continued evolution. "You know, when people leave I always worry that it's going to fall apart," said Liz Berquist, Director of Training and Development for Baltimore County Public Schools (BCPS), and an annual presenter at BCSC's Summer Institute. "But I don't feel like that in BCSC because it's part of their makeup, and who they are. Which is really good."

The current study tells the story of BCSC's journey as it was shared with members of the CAST research team. As researchers external to the district, we are mindful of our positionality: members of our team were not directly involved in implementation, and do not live within the community. Over the course of the last year, we have spent time in the district, analyzed data, and had more than 20 hours worth of conversations with individuals and groups who have been involved in implementation. We are deeply grateful to participants and partners for the time and care they have given in supporting this research, and look forward to sharing this story with the broader UDL community. Our hope is that this case study will spark curiosity, inspire engagement, and energize the field, while also providing guidance on confronting and minimizing barriers, and recognizing that the work of UDL is never "finished" but always pushing forward, until learning has no limits.

Methods

In order to answer our research question, we chose a case study approach to explore the bounded system of UDL implementation in BCSC. Because we wanted to look at both the process of UDL implementation within BCSC, as well as its impact, we selected a mixed methods approach, which allowed us to compile participant accounts of ongoing implementation processes, as well as data on student experiences, outcomes and teacher demographic trends.



Data Sources & Analysis

Qualitative data sources included individual interviews, focus group interviews, and a survey of certified staff members. We collected data at classroom, school, and district levels, and also researched the background of the local community, Columbus, Indiana, as the backdrop for this case study.

At the classroom/school level, we conducted observations of teaching and learning, and took photos of these learning environments. We also took field notes, conducted follow up interviews with observed teachers, and conducted a focus group with students of one of the observed teachers. At the district level, we conducted interviews with district leaders, and attended professional learning events, including the UDL Summer Institute, and New Teacher orientation. We also analyzed existing, publicly available data of district presentations, conference sessions, and professional learning videos that were available on the school website and/or on YouTube. We also administered a survey to all certified staff within the district to gather demographic information, as well as experience and comfort with UDL. Finally, at the community level, we reviewed published literature on BCSC's trajectory, took field notes of the surroundings during site visits, and interviewed external UDL experts within the broader UDL community who continue to work with the district.

Analysis of the qualitative data was iterative and ongoing (Bogdan & Biklen, 2007) as we conducted interviews, focus groups, site visits, and reviewed our growing corpus of data. The research team began by generating targeted memos after each interview. Team members were each assigned to clean transcripts by listening to interviews and focus groups to check for accuracy, which helped familiarize us with the data. To develop initial codes for

the data, each team member reviewed 2-4 artifacts, including transcripts and publicly available data **sources**, and generated a research memo of highlighted topics. These became our initial codes, and included preliminary codes such as “flexibility, locus of change, and resource allocation”; we then used these as the foundation of our open coding process (Saldaña, 2016).

Each team member selected one interview transcript to code with the gathered topics. At our weekly team meetings, we discussed the codes, explored areas for expansions and subcodes, and refined existing codes with clear parameters. Following this initial, individual round of coding, we identified the most frequently used codes, and conducted a second round of analysis with the frequent codes as a focus. From there, we identified themes across data sources and timepoints, and grouped them together to answer our research questions.

For analysis of quantitative data, a comprehensive dataset was built, which included student and corporation (district) level demographics from across the state. Descriptive statistics were analyzed, as well as results from t-tests in cases where researchers were able to test for statistical significance between BCSC and the rest of the state. Researchers also ran a logistic regression to answer questions related to the success of UDL at BCSC, controlling for student- and corporation-level demographics.

Findings

Our analysis resulted in several key findings. Here we focus on findings related to the relationship between CAST and BCSC, and how the reciprocity between these organizations facilitated implementation of UDL in BCSC, improved outcomes for educators and learners, and illuminated the potential of UDL implementation as a lever for sustained systemic change and impact.

CAST as Community Connection

Several participants discussed CAST's role in developing a community of interested educators from across the country, all of whom were early adopters of UDL, and who leaned on one another for support. As gradual UDL implementation began in specific BCSC schools, Van Horn began to connect with the broader UDL community through CAST events, and to tap into a network of leaders and learners who were eager to support one another.

“It helped tie us all together and gave us sort of this group of people who believed that UDL was a great framework, and also believed that we didn't really know what we were doing, and believed we were making it up as we go, and we needed each other's help and support. So CAST was really crucial in that.”

– George Van Horn, former Director of Special Education, BCSC

Embedded within this community was a culture of mutual support and feedback. As the UDL movement grew, early adopters grew into national experts who offered support for one another along the way. These early adopters, including Van Horn and Berquist, became members of CAST's cadre, where they came together to continue to share stories about

their own UDL work. When the time came for BCSC to launch its own summer institute, Van Horn invited Berquist to present, which she has continued to do almost every summer.

“George [Van Horn] said, ‘I want to do that, and like, I can't replicate the Harvard Institute, but I want to sort of replicate it as well as I can here in BCSC. Because it's so good.’ He was like, ‘what if I can bring some of these [CAST cadre] people out? Would you come?’ And people said yes.”

– Liz Berquist, Director of Training and Development, BCPS, and presenter at BCSC's UDL Summer Institute

While the CAST community provided a jumping off point for the creation and development of the UDL Summer Institute, its impact was not only in annual visits. Further partnerships were formed among CAST cadre members, and BCSC leveraged the deep expertise of these individuals to help address other needs, including supporting the increase of inclusion for students with disabilities. For example Lisa Carey, another CAST cadre member, talked about how she participated in more ongoing work with BCSC following her participation in the Summer Institute, continuing the work of learning from one another and giving feedback.

“I also started working on a grant project with BCSC about inclusion of kids that are not typically fully included, so they were focusing more on kids that had intellectual and developmental disabilities, where they were much more likely to be self-contained at the pre-K level and at the middle school level. So looking at transition years. And I was going to BCSC almost once a month to observe and give feedback.”

– Assistant Director for the Center for Innovation and Leadership in Special Education at the Kennedy Krieger Institute and presenter, BCSC’s UDL Summer Institute

The ongoing professional learning system initiated by BCSC in collaboration with CAST and other leaders in the field has remained a key piece of sustaining UDL as an overarching framework. It has also provided insights for CAST on successful models, and critical aspects of implementation and professional learning.

Better Outcomes for All: Engaging Teachers and Learners

As the relationship between CAST and BCSC continued to evolve and thrive, the impact of UDL across BCSC deepened for both teachers and learners. BCSC students consistently scored higher than the rest of the state on standardized assessments from 2014-2019.¹ In addition to better performance, the district also has higher rates of inclusion than the rest of the state, meaning that a majority of students with disabilities (approximately 90 %) spend at least 80 % of their time in general education. In addition, students identified as having learning disabilities have had continually improving skills, beginning far below the rest of the state in 2014, but ending above the state in 2018. District leaders attributed these successful outcomes in large part to UDL implementation.

¹ Analyses included students in grades 3-8 from 2013-2014 through 2017-2018, after which there was a change in test type, followed by a year of no testing due to the pandemic.

“We had students in every subgroup increase, passing the state test, every subgroup. And the only difference was we had really embraced UDL, and we were really looking at options and barriers, and how do we give kids that? And it was making a difference.”

– George Van Horn, former Director of Special Education, BCSC

The impact of UDL however, extended beyond test scores. And while school leaders were encouraged by, and recognized the importance of these data to be able to show the impact of UDL on student performance, other aspects of the district’s culture and values were the most meaningful aspects for them, such as opportunities for teachers to continue to push and stretch their practice, and the way they thought about their learners. Rather than focusing on compliance, the emphasis was on engagement for both students and teachers. Teachers had access to ongoing professional learning during the year, and in the Summer

Institute, and they also had the opportunity to reach out to the UDL Facilitator assigned to their school for feedback or with questions.

“The resource of having a UDL facilitator in the building is phenomenal. Because I can go to them and say, here’s the lesson, here’s the goal that I want, here’s what I normally do with this, give me something new, work with me on how I can still get these results but, but try something different... And I do know that [the facilitators are] the best resource that we have.”

– Meagan Hearne, high school teacher, BCSC

Developing a culture where teachers could access these supports was important to BCSC, as district leaders wanted to ensure that teachers had resources to continue to build their skills in improving their environments. Results from a survey of certified staff suggest that teachers are feeling confident in their own UDL practice. Almost three-fourths of educators (73.3 %) surveyed reported that they feel either confident or extremely confident in applying UDL to their practice. The district also administers an engagement survey twice a year to help define their focus and guide strategic planning for future years. Jim Roberts, BCSC’s superintendent from 2015-2024, attributes teacher engagement to much of the district’s success in retaining teachers. BCSC has a retention rate that is higher than 90 percent from year to year.

“We do care whether you’re happy or not. We care more about whether you’re engaged in our students’ learning and so that’s why...and our scores keep increasing.”

– Jim Roberts, Former Superintendent in BCSC

The culture of engagement created and sustained in BCSC, along with UDL implementation suggests a positive effect on students as well as teachers. In addition to performance on standardized assessments, teachers report that students’ overall wellbeing is noticeable.

“I think, in a UDL-rich environment, I just think the kids feel like they are more welcomed, like they matter because you are doing everything you can to kind of put them first. So I think that stretched me because you know, I definitely had a perception as to what a classroom was like and what teaching was like. And it’s gone in a very different direction, but very much in a good way.”

– Molly Fountain, middle school teacher, BCSC

The impact of BCSC’s UDL environment encompasses benefits for learners as well as teachers, which ultimately has had positive effects on the culture as a whole. Increases in student performance, student and teacher engagement, and the emphasis on continuous learning culture continues to sustain UDL in BCSC, and allows its educators to continue to work toward more systems-level change.

UDL as a Lever for Systemic Change

The implementation of UDL at a cross-district scale not only had an effect on teacher and student learning, but also for systems-level change. Because UDL had been established as the district's central organizing framework, leaders were able to think critically about how to (re)design processes and procedures to align with UDL's guiding principles. This involved clarifying and honing in on the district's goals, identifying and minimizing barriers to meeting those goals, and being strategic about how to proactively design sustainable systems to maintain progress toward their continuously evolving goals.

Because BCSC was committed to improving learning experience and outcomes for every student, UDL's emphasis on both quality instruction and design, and the development of expertise in learning made it a great fit. In other words, UDL highlighted the powerful relationship between teaching and learning, thus necessarily involving both educators and students as key agents in the process.

“This was really a way to bring some unification to the learning process...I was like, oh my goodness, this is not just for our educators. I started seeing, this is something that needs to be revealed to students. Students need to know how their brains work and what learning looks like. And so UDL was also a way to not just teach students how to learn, but to teach students how they learn.”

– Rhonda Laswell, UDL Coordinator, BCSC

The goal of developing expert learning for every student required district leaders to examine how they had been addressing learner variability, what was working, and what might be improved. As the Director of Special Education, Van Horn wanted to focus on what students were being taught, not only how. Early in his tenure at BCSC, he noticed differences in content across general and special education, and an early goal became the assurance that students with disabilities were able to have access to the general education curriculum. As UDL implementation took hold, the focus then shifted to expanding teachers' ability to reach every learner.

“This isn't about telling teachers, you know, how they're going to teach this or what they're going to teach. This is about helping teachers realize that they need to look at their learning environments and really target and give options and remove barriers. And it just made sense.”

– George Van Horn, former Director of Special Education, BCSC

Van Horn recognized that in many cases his role was to be the “Wizard of Oz” behind the curtain. He, along with other leaders within the central office, including Jenson, and Jessica Vogel, current Director of Special Education, saw their roles as supporting faculty development, and getting out of educators' way so that they could do their jobs. But much of this role also involved reallocating resources to ensure that teachers had continued support from one another, not just from their supervisors. As

UDL implementation continued to expand, the impact on students allowed the opportunity to reallocate positions to UDL coaching (facilitator) positions.

“The only new money position was Rhonda’s [UDL coordinator position.] Other than that, all the facilitators,... everybody else were funds that were funding something else. And we repurposed those as a priority, you know. And people always used to ask that, where’d you get all the money from? I’m like, well, we did a better job in regular ed serving kids.”

– George Van Horn, former Director of Special Education, BCSC

As outcomes continued to improve for students with disabilities, BCSC’s rate of inclusion also increased. Between 2014 and 2019 (just before Covid), BCSC’s district-wide state assessment scores improved, along with an increase in inclusive placements for students with disabilities. During this time, Van Horn shared that students were showing improvements across all subgroups, including students with disabilities, multilingual learners, and students eligible for free or reduced priced lunch.

While positive student outcomes such as these are undoubtedly a measure of success, it’s important to remember that consistent iteration and a focus on the goal of high quality learning for every student drives the sustainability of UDL in BCSC. Reallocated resources such as UDL facilitators, and ongoing professional learning offerings such as the Summer Institute, while once novel, are now simply part of what they do to maintain a culture of UDL, and continue to push themselves forward.

Embedding UDL into the teacher evaluation has been successful because it not only highlights the value the district places on UDL and learner variability, but it also holds leadership accountable for maintaining supports for teachers. In this way, educators at every level, district, building, and classroom, can focus on creating spaces that are flexible, and can be adapted to meet individual needs.

“We need to focus the supports on the environment versus the kid, right? Not saying that there aren’t kids that aren’t going to need extra additional supports. We’re not saying that, but if I become a support for the environment, then that support can stay there and be part of that teacher’s tool kit.”

– Rhonda Laswell, UDL Coordinator, BCSC

BCSC continues to push forward with UDL implementation, despite recent turnovers in leadership within the central office. Their UDL Summer Institute continues annually, and as student needs evolve and change, so does what the district offers to educators and students. This journey was recently featured in the Office of Educational Technology’s [National Educational Technology Plan \(NETP\)](#), which highlights their goal of meeting the needs of all learners, from 2003 to the present.

Conclusion

The story of Universal Design for Learning in the Bartholomew Consolidated School Corporation is one example of how a district might iteratively implement the framework across a complex system at a large scale. Connections with CAST, other UDL leaders in the field, and a desire to improve experiences and outcomes for every learner drove the need for change, and continue to push the work forward at every level. For BCSC, that means recognizing that learning is happening for everyone, not just students, but teachers and administrators as well.

With UDL as a guiding, overarching framework, the district has been able to continue to learn, iterate, and continually revisit, reflect upon, and refine their goals for more than two decades. For BCSC, there are ongoing goals that they are working toward, such as increasing their rates of inclusion for students with disabilities, and expanding pathways for graduation and certifications for high school students. Regardless of how or when these goals are met, the findings reported here suggest that the firm foundation and legacy of UDL implementation that has been growing for years will continue to guide the way.



References

- Bogdan, R. C., & Biklen, S. K. (2007). *Research for education: An introduction to theories and methods* (5th ed.). Pearson.
- CAST (2024). *Universal Design for Learning Guidelines* (version 3.0). Retrieved from <http://udlguidelines.cast.org>
- Coyne, P., Pisha, B., Dalton, B., Zeph, L. A., & Smith, N. C. (2012). Literacy by design: A universal design for learning approach for students with significant intellectual disabilities. *Remedial and Special Education, 33*(3), 162–172. <https://doi.org/10.1177/074193251038165>
- Griful-Freixenet, J., Struyven, K., & Vantieghem, W. (2021). Toward more inclusive education: an empirical test of the universal design for learning conceptual model among preservice teachers. *Journal of Teacher Education, 72*(3), 381-395.
- Fornauf, B. S., Reagan, E. M., Mccurdy, K., Mascio, B., & Collins, M. (2023). Universal Design for Learning in a Teacher Residency: [Re]Framing Tensions through Collaborative Self-Study. *Studying Teacher Education, 19*(1), 102-124.
- Gordon, D., Ed. (2024). *Universal design for learning: Principles, framework, and practice*. CAST Publishing.
- King-Sears, M. E., Stefanidis, A., Evmenova, A. S., Rao, K., Mergen, R. L., Owen, L. S., & Strimel, M. M. (2023). Achievement of learners receiving UDL instruction: A meta-analysis. *Teaching and Teacher Education, 122*, 103956.
- Ok, M. W., Rao, K., Bryant, B. R., & McDougall, D. (2017). Universal design for learning in pre-k to grade 12 classrooms: A systematic review of research. *Exceptionality, 25*(2), 116-138.
- Rao, K., Ok, M. W., & Bryant, B. R. (2014). A review of research on universal design educational models. *Remedial and special education, 35*(3), 153-166.
- Rappolt-Schlichtmann, G., Daley, S. G., Lim, S., Lapinski, S., Robinson, K. H., & Johnson, M. (2013). Universal Design for Learning and elementary school science: Exploring the efficacy, use, and perceptions of a web-based science notebook. *Journal of Educational Psychology, 105*(4), 1210–1225. <https://doi.org/10.1037/a0033217>.
- Rose, D. H., & Meyer, A. (2002). *Teaching every student in the digital age: Universal design for learning*. Association for Supervision and Curriculum Development.
- Saldaña, J. (2016). *The Coding Manual for Qualitative Researchers (3rd edition)*. SAGE Publications.
- Scott, L., & Temple, P. (2017). A conceptual framework for building UDL in a special education distance education course. *Journal of Educators Online, 14*(1), n1.
- Story, M. F., Mueller, J. L., & Mace, R. L. (1996). *The universal design file: Designing for people of all ages and abilities*.
- Van Horn, G., Laswell, R., Vogel, J., & Greene, T. (2023). Districtwide Implementation of Universal Design for Learning. In L. M. Nellis & P. A. Fenning (Eds.), *Consultation and Change in Schools: Integrating Implementation Science into Practice* (pp. 135-147). Springer International Publishing.
- Zhang, L., Carter Jr, R. A., Greene, J. A., & Bernacki, M. L. (2024). Unraveling challenges with the implementation of universal design for learning: A systematic literature review. *Educational Psychology Review, 36*(1), 35.

