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## Using Learning Progressions to Enhance Student Outcomes and Performance

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**Using Learning Progressions to Enhance Student Outcomes and Performance**

Andrea Werner

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Capstone Project: A School Improvement Plan

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August 21, 2022

### **Abstract**

Learning discrepancies are difficult for students to recover from. In earlier years, rote memorization, drill-and-practice, and whole-group instruction have proven little success. Students continually lack proficiency and have minimal gain year after year. More recently, small groups and interventions have made improvements on student proficiency, but they still struggle to increase overall student achievement. Research suggests learning progressions as a dynamic, individualized approach to increase not only academic achievement, but also depth of knowledge and student efficacy. Learning progressions allow for flexibility in levels of learning, the content taught, and how a student grasps information. Then learning progressions promote rigorous and relevant programs for students. Educators who accurately diagnose student needs, build corresponding learning progressions, develop a matching curriculum, and deliver the instruction with appropriate use of formative assessments will increase their students' achievement and make a positive impact on the educational system.

*Keywords:* learning progressions, formative assessment, student-centered, interventions, instructional design, instructional delivery

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## **Using Learning Progressions to Enhance Student Outcomes and Performance**

In 2021, 13% of Iowa's students qualified for special education services (Iowa Department of Education, 2021b) and 73.8% (Iowa Department of Education, 2022d) of them graduated high school. The problem is, without individualized education programs (IEPs) written to span all of a child's discrepancies, measurable growth will continue to lack, as will graduation rates of students with learning disabilities. Researchers have investigated, developed, and implemented learning progressions in the areas of reading, writing, English as a second language, math, and science to address specific needs (Bailey & Heritage, 2014; Duschl, 2019; Furtak & Heredia, 2014; Hovardas, 2016; Mosher & Heritage, 2017; Nelson et al., 2018; Osborne et al., 2016; Pierson et al., 2017; Shea & Duncan, 2013; van Rijn et al., 2014). Those learning progressions have proven to enhance student learning in both the general education and special education settings (Burns et al., 2020).

Students who utilize learning progressions within their IEP goals are more successful in the general education setting. The purpose of this school improvement plan is to provide the Independence Community School District's 13.5% (Iowa Department of Education, 2021b) students with learning disabilities an influential program through the individualization and implementation of learning progressions. The hope when reading this is teachers will have the ability and confidence to diagnose their students' needs with precision, know how to write parallel learning progressions, and ultimately increase student achievement.

The resources for this information are a compilation of texts throughout my course of study at Northwestern and from the DeWitt Library, also within Northwestern. Only a few of the articles date back into the late 1900s and are used to evaluate the history of learning progressions and diagnosing discrepancies. For the remaining resources, they met qualifications by being

within the last 10 years and by being representative of the ways students learn in literacy, math, and the sciences. These studies provide insight into the complexity of learning and how teachers can address student needs with meticulousness.

Students with IEPs perform better in their general education classroom when their goals are written using state standard progressive rubrics or learning progressions because their instruction is around a student-centered learning sequence of discrepancies (Duschl, 2019). The value of this stems from within the child. They will recognize their own abilities and struggles as well as know exactly what they need and how to get there without feeling as if they are just floating throughout each school day. When this happens, students begin working for achievement rather than completion of a task. Achievement then evolves into self-worth and greater classroom success.

The following literature review is structured with a progression of sorts in mind, beginning with a record of educator proposals around learning in small increments. The idea of learning progressions is nothing new but took decades to become valuable research. The next piece focuses on the student and the significance of becoming invested in their own learning. Without being vested, a student will not learn. The third and fourth sections of the literature review apply to the teacher and their ability to put purpose behind what they teach and how they teach it. Being able to diagnose discrepancies, provide appropriate instruction, and continually adjust as necessary is pivotal in making progressions work. More details to this information will be found in the following categories: 1. The history of learning progressions; 2. Student self-advocacy; 3. Instructional design; and 4. Intervention design.

## **Review of Literature**

In her retirement symposium, Adele Wolfson (2019) captured her audience with her description of learning progressions as a metaphor for life. Comparing her growth as a biochemistry college professor to her students' growth of becoming experts in a field, Wolfson explained there is no linear path to the success of either of those. With "ups and downs and interesting side-trips" (p. 496) we learn at various levels and at intermittent rates (Pierson et al., 2017). Designing and implementing learning progressions provides for this flexibility in learning at all levels. This research supports the notion of using learning progressions to design IEP goals and improve student outcomes associated with general education expectations.

### **Historically Speaking**

In 1985, Eisner and Rehage had earlier insight on how people learn progressively and with variance. They said in their explanation of learning, "...the roads to knowledge are many. Knowledge is not defined by any single system of thought, but is diverse" (p. xi). The late 1980s brought a push for educational change from rote memorization and educating children in cattle-in cattle-out concept, referring to it as an "informal and haphazard affair" (p. 62), to teaching to the whole child and their way of gaining mastery. Understanding and reasoning of a person does not come with them at birth, yet through experiences and within context of the subject matter (Eisner and Rehage, 1985).

Learning comes at different times with multiple facets affecting student learning (Eisner and Rehage, 1985). Cognizance of child development is foundational for creating a transparency for students, a pedagogy for teachers, and an effective means of developing interventions.

Learning progressions have been gaining steam in the PreK-secondary education setting for



nearly two decades and have become more than a new trend in education (Burns et al., 2020; Childress et al., 2019; Nelson et al., 2018; Pierson et al., 2017).

In Burns et al.'s (2020) recent research of 399 2<sup>nd</sup> and 3<sup>rd</sup> grade readers, the students who received tier 1 interventions made 19.4% more growth in just three assessment periods in comparison to their grade level peers who were receiving special education interventions. This growth is a significant difference and representative of special education requiring systemic changes more reflective of the processes done in the general education setting. When referring to math and science discrepancies, both Nelson et al. (2018) and Pierson et al. (2017) had similar findings when identifying and teaching sub-skills through learning progressions. The study participants overcame discrepancies whether they were or were not identified to receive special education services. What's important to note, is both studies were within general education settings, yet they still were able to benefit students identified for services. This information suggests learning progressions, when developed uniquely for students with disabilities, will have a greater impact on student achievement than if traditional IEPs continue to exist with goals written to a singular skill.

Questions of teacher competency when creating accurate progressions (Heritage, 2008, Pierson et al., 2017) and measuring mastery (Nelson et al., 2018) did arise in these studies, but they subsequently landed on special education services missing something in their instructional and intervention methods (Burns et al., 2020). This revelation continues to suggest the importance of identifying skill gaps, creating accurate progressions, and teaching with intention to combat the lack of growth special education students experience. Merging learning goals and the circumstances they will be obtained is a foundational concept to good teaching practice and knowledge outcomes for students (Heritage, 2008).

## **Student-Centered Approach**

“Student-centered learning demands progressive means of assessment that enable students to view learning as a process to develop and use strategies to meet or exceed assessment expectations” (Ragupathi & Lee, 2020, p. 73). In literacy research from Childress et al. (2019), showing students where they are on the learning continuum and how they can progress allows them to take ownership of their learning. It provides unclouded expectations between the teacher and the student building a fairness and trustworthy component to their educational experience. In turn, this team approach promotes student-awareness and self-advocacy (Duckor & Holmberg, 2019). When researching English language learners, Baily et al., (2014) used and confirmed a heuristic approach to student learning is imperative. When “...a student’s patterns of experience, social interactions, and cognitive processes...” (p. 483) are considered, students feel they are understood from all perspectives. Using the heuristic method, Baily et al., (2014) created dynamic language learning progressions (DLLPs) to describe multiple dimensions influencing development simultaneously, and they capture various pathways of progress taken by diverse students. Not only does this allow a teacher to learn a student, but it also supports them in diagnosing and writing prescriptive instruction distinctive to the student (Baily et al., 2014; Ragupathi & Lee, 2020; Shea & Duncan, 2013). To address the complications of learning, Hammer & Sikorski (2015) did their research within the K-12 and professional learning settings and determined “Phenomena of cognition and learning are complex” (p. 427). It is imperative to structure learning around a student’s “idiosyncrasies” (p. 425). When doing so, the student is able to gain a readiness to learn, have a sense of pride, and be given an opportunity to achieve classroom expectations.

From research in global higher education, Shea & Duncan (2013) focused their explorations on progressive rubrics and the equity they provide, claiming diversity and inclusion are of their essence. They speak to the idea “...too often the existing literature frames student diversity as a challenge to be overcome for faculty teaching, rather than an opportunity to advance student learning” (p. 2). Especially for students who receive special education services, we must approach their learning in the way Shea & Duncan (2013) recommend. In doing so, education will be student-centered and the epitome of what an individualized education program (IEP) should be. Special education teachers are provided the unique opportunity to dive deeply into a student’s abilities, discrepancies, and complexities and write a prescriptive program for their success. When completing this process, the student becomes the focus and academic growth is inherent.

### **Instructional Design**

Thinking outside of the realm of education and more inside the realm of how humans succeed, it is important to be reflective of ourselves and how we operate to get through daily routines and expectations. Often, we put successive tasks in place or follow procedures to get us from one point on our continuums to another, even when we are simply trying to balance family schedules, work schedules, and get food on the table. Doing so lends to systematic and organized functions giving us tasks to accomplish and operate as a thriving unit. Bingham & Davis (2012) took this idea into their own research. While educators themselves, they studied learning processes in an outside context. They dove into the world of how entrepreneurial firms learn during the internationalization process into the United States, Singapore, and Finland. Bingham & Davis (2012) asked three pertinent questions: 1. Do learning sequences exist? 2. Do learning sequences matter? 3. Do learning sequences evolve over time? The short answer is yes to all

three, with the distinctions being sequences matter for short-term performances and learning sequences both evolve and contract over time. (Bingham & Davis, 2012). This contraction is one of their greater findings because “Executives seemed to assume they already knew how to do business in different countries and therefore only needed to draw on their own experiential wisdom” (p. 626). Like the lag this created in the firms’ expansions, it will do the same in developing instruction. It is pertinent assumptions are not made as to what a student is able to do in order to produce an appropriate program for them (Bailey & Heritage, 2014; Bingham & Davis, 2012; Childress et al., 2022; Duschl, 2019; Hammer & Sikorski 2015; Nelson et al., 2018; Shea & Duncan, 2013; Wolfson, 2019).

A student’s ability cannot be measured by traditional assessment and designing instruction without knowing a student’s ability will not be effective. Duckor & Holmberg (2019) argue many students can end up with the same summative score, but their subskills can vary greatly. This imposes the idea mastery cannot be measured by a test score and must be embedded into instruction. In a three-year double study of roughly 2,000 high school biology students, Furtak & Heredia (2014) developed and implemented progressions to determine their synchronization to “...instructional plans, developing formative assessments, and interpreting student ideas” (p. 988). While learning progressions did not end up being the focal point of the teachers’ reflections in this study, the teacher felt the progressions were a roadmap for developing successful formative assessments (Furtak & Heredia, 2014).

In more recent research, Childress et al. (2019) explain, “curriculum-embedded assessments for learning can help educators shift their assessment perspective to a more equitable student-centered lens” (p. 371). This perspective will help the educator determine where the student is on a learning continuum rather than focus on the level of achievement

(2019), thus making instructional preparation more distinct and applicable to the student's needs. When taking level of achievement out of instructional design, educators can have what Bailey et al., (2014) describe as an "intra-grade development" (p. 481). When studying literacy growth with 325 English language learners and those with diverse language experiences, they found primary skills missing, thus making growth more difficult (Baily et al., 2014; Hovardas, 2016; Shea & Duncan, 2013). Recognizing students may need additional support from preceding grade level standards is important when planning instruction as it will provide a greater foundation for future learning. Pierson et al. (2017) explain in their science findings the scaffolding required to develop progressions allows for higher levels of competency, differentiated learning, and a range of student performance. This scaffolding then supports designing IEP goals around progressions to provide a more rigorous special education program where each student receives highly effective specially designed instruction.

Not with confliction, but perhaps trepidation, Jin et al., (2019) found science learning progressions challenging for teachers and might advise proceeding slowly when building them into instruction. Jin et al., (2019) believe progressions have advanced significantly, yet the content knowledge needed to develop them is lacking in both depth and breadth and teachers need to have supports in place when tackling their complexity. No matter the content of the learning progressions being developed, Furtak & Heredia (2014), Heritage (2008), Duckor & Holmberg (2019), Duschl (2019), Jin et al., (2019), Hovardas (2016), and Mosher & Heritage (2017) suggest professional learning opportunities for teachers to develop progressions spanning across topics and disciplines, as well as how to use them in coordination with interventions and large-scale assessments.

### **Intervention Design**

With the use of learning progressions, teachers can more than adequately develop interventions to target a student's discrepancies (Childress et al., 2019; Nelson et al., 2018). "Learning scales and micro-progressions illuminate concepts and skills that teachers need to teach intentionally to move students toward proficiency" (Childress et al., p. 373). This research continues to provide subsequent proof when dissecting learning outcomes and putting them into explicitly taught lessons. Student learning increases more than for those who are taught on a broad concept (Burns et al., 2020; Nelson et al., 2018).

In Hovardas' (2016) work with 55 pre-service teachers, where they were the participants of a three-unit ecology predator/prey simulation, only 44% showed change in their ways of thinking from linear to non-linear reasoning when making predictions about animal trajectories. Fifty percent of the pre-service teachers didn't change their methods, and 4% of the teachers "regressed" (p. 1461) from non-linear reasoning to linear reasoning (Hovardas, 2016). While this study was done with adults, it supports the notion the way people learn to think and reason is complex (Bailey & Heritage, 2014; Hammer & Sikorski, 2015; Hovardas, 2016) at all stages of life, and regression should always be considered when developing interventions for students. "The routes that learners might take in their move from lower to upper anchors might involve — apart from progression—stagnation as well as regression back to lower anchors" (Hovardas, 2016, p. 1454). Being conscious of this allows educators to make an accurate diagnosis of discrepancies thus develop more accurate interventions.

In agreement with Hovardas (2016), Osborne et al., (2016) and van Rijn et al., (2014) did similar research concerning students' competency in arguing their stance over a topic. Both were large-scale studies with van Rijn et al., (2014) evaluating 1,840 seventh through ninth graders, and Osborne et al., (2016) studying over 800 middle school students. Large-scale

assessments, cognitive think-a-louds (Osborne et al., 2016), and written responses (van Rijn et al., 2014) proved students were positively affected with the use of learning progressions. Like Hovardas (2016) determined, Osborne et al., (2016) and van Rijn et al., (2014) agree learning progressions are multidimensional and useful when working with students of varying abilities because they allow instruction for different skill levels. Students are allowed to have flexibility in their learning where both horizontal and vertical (Jin et al., 2019) progress may occur.

Sometimes, what constitutes mastery of a skill or concept can be unclear (Nelson, 2018) and seem difficult to measure without the use of a traditional summative assessment. While summative assessments can provide data in how students compare to one another in broad concepts, they do not provide information on what's missing from their conceptual framework. Foundational skill information comes from formative assessments built into instruction (Bailey & Heritage, 2014; Duckor & Holmberg, 2019; Duschl, 2019; Furtak & Heredia, 2014; Heritage, 2008; Hovardas, 2016; Osborne et al., 2016; Ragupathi & Lee, 2020; van Rijn et al., 2014), suggesting formative assessments should be at the heart of special education interventions. In the research of Shea et al., (2013), they found empirical data to be the best summative evaluation. Observations and formative assessments offered a deeper understanding of where their students were on a learning continuum. With this, both qualitative and quantitative data can be collected to prove a student's mastery of a task and allow the teacher to make instructional decisions in the moment. Combining a learning progression with coinciding formative assessments forces intention in instruction and allows for considerable growth, providing exceptional interventions.

For students with disabilities, guaranteeing flexibility in their learning route is essential to their success, and the research continues to support the use of learning progressions when developing IEPs (Burns et al., 2020; Ragupathi & Lee, 2020). Implementing learning

progressions into the special education setting, the highest level of intervention, has promise for students achieving foundational skills, reducing discrepancies, and promoting general classroom competency.

### **Discussion**

This literature overwhelmingly supports use of learning progressions as effective tools for intervention. It promotes a student's ability to self-advocate, the teacher's analytical expertise to design powerful educational programs, and the understanding people, no matter the age or circumstance learn on a continuum. While this research lacked specifics on the influence of learning progressions used in a special education setting, it is not limited in evidence of using them in multiple curricular capacities or with students of varying abilities. This research suggests using learning progressions to write IEPs may be effective in eliminating several discrepancies a student may have. Thus, closing their gaps more swiftly than if their IEPs are written to a singular skillset. Future research would be worthwhile to continue this from the perspective of a special education classroom and its effects on student performance in the general education setting. The implications may lead to positive change within the system of special education.

### **Conclusion**

The purpose of this literature review was to determine if using learning progressions or progressive rubrics to design IEP goals with special education students would increase their performance in the general classroom. The information does suggest learning progressions are effective in increasing student self-advocacy, building transparent relationships between the teacher and the student, offering differentiated instruction, creating rigorous expectations, and ultimately increasing student achievement. Learning progressions encompass the human nature of learning and are applicable to all students. It is my conclusion further research would be



appropriate to determine the association between IEPs designed in this manner with special education students and their performance in the general education setting, however the implications of the research support the design of the following school improvement plan.

## **School Profile**

### **Student Performance**

Independence Community School District (ICSD) is an above average district in Northeast Iowa (Iowa Department of Education, 2021a). For the 2021-2022 school year, 1,435 students attended ICSD and had a graduation rate of 95%. ICSD is ranked in the top 5% of the state for their graduation rate (Public School Review, 2022). On average, 76% of the students are proficient in math, and 70% of the students are proficient in reading (Public School Review, 2022).

### **Student and Community Characteristics**

The students of ICSD are part of a midsize rural community. The current population is 5,966 (Independence, Iowa Area Chamber of Commerce, 2022) with 92% living within the urban area and 8% living in the rural area (Advameg, Inc, 2022). The population includes 29.2% school-aged children in the age range of five to 18 years old (U.S. Department of Commerce, 2021). Approximately 94% of the town's population is white, 4% Hispanic, just over 1% mixed-race, less than 1% black, and less than 1% American Indian (Advameg, Inc, 2022). As of 2019, Independence was considered to have a low cost of living in comparison to the rest of the United States sitting at an index of 77.5 versus the index of 100 for the rest of the nation (Advameg, 2022). Just under 10% of the community lives in poverty, with 10% of white, 100% of black, 9.7% of Hispanic, and 8.6% of the mixed races living this way (Advameg, Inc, 2022).

### **School District Characteristics**

ICSD is comprised of four buildings with one early childhood center, two elementaries, and a junior/senior high. East Elementary is home to junior kindergarten through second grade, and West Elementary serves third grade through sixth grade (Independence Community School District, 2022a).

East Elementary has five teachers per grade level, except for junior kindergarten having one teacher, and there are three additional special education teachers serving junior kindergarten through second grades (Independence Community School District, 2022a). West Elementary has five teachers in fourth grade and four teachers for each of fifth and sixth grades. They too have three additional special education teachers serving third through sixth grades. Both elementaries offer music, art, physical education, media, and onsite counseling (Independence Community School District, 2022a).

The junior/senior high houses the remaining seventh through 12<sup>th</sup> grade students (Independence Community School District, 2022a). In addition to traditional sports being available to the seventh through 12<sup>th</sup> graders, including bowling and swimming, ICSD offers an additional 16 clubs and organizations (Independence Community School District, 2022b). ICSD is also known for their “award winning” bands, with organized marching band becoming available to students as early as fifth grade (Independence Community School District, 2022c). Both choir and drama are also highly reputable with nearly one third of the junior high seventh and eighth graders making up the early years of the choir program (Independence Community School District, 2022c).

### **Parent Involvement**

ICSD has an active parent teacher organization (PTO), supporting much of the junior kindergarten through sixth grade fundraising efforts and community outreach. From providing

large donations for playground equipment and field trips to organizing carnivals and family activities, the PTO strives to get parents involved with their child's school experiences (Independence Community School District, 2022d). In addition to the PTO, ICSD works to include parents in much of the district's planning and initiatives. Beyond the traditional outreach of parent-teacher conferences, newsletters, and emails, ICSD consistently surveys parents to acquire their feedback concerning school events. In an interview with Erin Burmeister, the Director of School Improvement (June 22, 2022), she explained parents are represented on many committees in the district. The most typical involvement is representation on the school board; however, they have many other opportunities to be involved on the technology team, the School Improvement Advisory Committee, and then each of the school buildings has their own parent committee. Burmeister (June 22, 2022) explained some parents prefer not to be involved in-person, so the district is diligent in providing many occasions for families to complete questionnaires and surveys. The district regards this information as highly valuable and uses it as guidance in planning for student success (E. Burmeister, personal communication, June 22, 2022).

## **School Mission and Vision**

### ***Mission Statement***

Educating people to be life long learners and respectful, responsible citizens (Independence Community School District, 2022e).

### ***Vision Statement***

Creating a climate where individuals of the Independence Community School District will strive to become effective communicators, problem solvers, responsible citizens, and productive people (Independence Community School District, 2022e).

## **Current Student Learning Goals**

In personal communication with Erin Burmeister on June 22, 2022, she provided the following goals for ICSD:

### ***Long Range District Goals***

- increase achievement in reading
- increase achievement in math
- increase achievement in science

### ***Bullying and Harassment Prevention Goals***

- decrease the number of founded cases of bullying
- increase positive adult to student relationships as evidenced in the Conditions for Learning Data
- increase positive student to student relationships as evidenced in the Conditions for Learning Data

## **Reflection: Teachers, Curriculum, Practices, Assessments, and Professional Development**

In personal communication with the Director of School Improvement, Erin Burmeister explained (June 22, 2022), ICSD has put several efforts in place to increase student achievement and be a valued part of the Independence community.

ICSD teachers and staff operate as a professional learning community (PLC) (About PLCs | All Things PLC | Powered by Solution Tree, 2006). They meet weekly to evaluate data and make student-centered instructional decisions. Unique to ICSD is the intentional planning around special educators and their PLC. Their work with the students highest at-risk is believed to be foundational to school success, so the district is intentional in creating the time for special education teachers to collaborate just as if they were general education teachers.

The curriculum used in the junior kindergarten through sixth grades is changing in mathematics to Illustrative Mathematics (2021). The district has put much effort into understanding the Common Core State Standards (CCSS) (Common Core State Standards Initiative, 2021) and believe Illustrative Mathematics (2021) aligns most closely with them. For literacy, ICSD uses Lucy Calkins (Heinemann, 2021) because they believe teaching with a workshop model allows students to engage with literacy from different standpoints.

Currently, the ICSD is working to adopt standards reference grading. They are collaborating with the community and school board to design a grading structure specific to CCSS (Common Core State Standards Initiative, 2021). A standards-based grading structure will allow students to have unique learning experiences targeting precisely what they are lacking. Standards reference grading has not been approved by the board yet, but continuous efforts are in place to prove its success in the surrounding school districts. With this way of grading, ICSD believes they can more accurately use summative assessments to indicate lacks in curriculum and instruction. Especially with the use of Measurements of Academic Progress (MAPs) (NWEA, 2022), pinpointing academic achievement and growth in reading, writing, math, and science, ICSD is aiming for rapid growth in the student learning goals. Additional assessments the school district uses for both formative and summative assessments are FastBridge (2021) for fluency and Iowa Statewide Assessment of Student Progress (ISASP) (Pearson Education, Inc, 2022) for comprehension, writing, math, and science. ICSD believes these three district-wide assessments provide similar information, but from different perspectives. This allows a student to be fairly represented and assessed on their abilities and discrepancies.

In an extensive project, the school and community developed a “Portrait of a Graduate” following the guidelines of Battelle for Kids (2022). The purpose of this was to approach

learning from an all-encompassing perspective of families, the community, and the school, working together to have lasting support for the students. ICSD uses the information from this as a foundation for all they do during professional development and learning opportunities for staff. The focus is always on the student and what it is they need to be successful.

## **Needs Assessment**

### **Curriculum and Instruction**

When thinking about there being a need in curriculum and instruction, a teacher often jumps to the conclusion the curriculum provided by the district should be the only requirement to know how to teach well. Contrary to the assumption, there is a significant piece of teacher knowledge missing from the equation. It is common to know what is supposed to be taught within a grade level, but rarely do educators know what is to be taught in other grade levels. Teachers and educators must know the grade level standards they are teaching, what standards precede and follow those standards and from what grade level they come. From there, the teachers and educators can begin to correctly identify skill gaps and discrepancies for students. Once they have appropriate diagnosis of the skill gaps and discrepancies, the teachers and educators can use the curriculum to address lacks of understanding and make significant improvement on their students' growth.

In the spring of 2021, 61% of ICSD students in grades kindergarten through sixth were at or above benchmark on the FAST fluency assessments (FastBridge, 2021). By the spring of 2022, the goal was to increase that percentage to 75%, however, the number of students proficient dropped to 60% (E. Burmeister, personal communication, June 22, 2022).

On ISASP (Pearson Education, Inc, 2022), 68% of fourth through sixth graders were proficient in ELA in the spring of 2021. Scores were not available for third grade from this

testing period. In the spring of 2022, 69.75% of third through sixth graders were proficient in ELA. This shows a 1.75% increase in ELA proficiency. For math on ISASP (Pearson Education, Inc, 2022), 68% of fourth through sixth grade students were proficient. Data was not available for third grade at this testing period. In the spring of 2022, 68.5% of third through sixth grade students were proficient in math. This shows half a percent growth in math.

In personal communication with Erin Burmeister (June 22, 2022), ICSD had set a short-term goal of 75% of students being proficient in both ELA and math in the spring of 2022 and a long-range goal of 80% of students being proficient by the spring of 2023. With 60% of kindergarten through sixth grade students proficient on FAST (FastBridge, 2021) assessments and 69.125% of third through sixth grade students proficient on ISASP (Pearson Education, Inc, 2022) assessments in the spring of 2022, ICSD is struggling to increase student performance. They did not meet their short-term goal, which is indicative of not meeting their long-term goal.

It would benefit the teachers and educators of ICSD to learn multiple grade levels of CCSS (Common Core State Standards Initiative, 2021), how to identify they are being taught throughout the provided curriculum, and how to assess they are being achieved. The following school improvement plan will address this for the teachers and educators of ICSD.

### **Data Analysis**

As noted in the Needs Assessment, ICSD is working toward 80% proficiency for their students by spring of 2023. Depending on the assessments analyzed, ICSD is 10-20% below their goal, with one school year to work toward it. FAST fluency (FastBridge, 2021) assessments are a cumulative 20% below the district goal. ISASP (Pearson Education, Inc, 2022) assessments, including comprehension, writing, and math are a cumulative 10% below the district goal.

### **FAST Data Analysis**

In the following tables, FAST (FastBridge, 2021) data is presented for the fall of 2020, winter of 2021, spring of 2021, fall of 2021, winter of 2022, and spring of 2022, allowing a visual comparison of proficiency changes over a one-to-two-year span. In addition, to identify challenges or strengths in specific grade levels and buildings, Table 1 includes East Elementary's kindergarten through second grade levels' scores, and Table 2 includes West Elementary's third through sixth grade levels' scores. Table 3 is summative data showing cumulative kindergarten through sixth grade proficiency over the same time periods as found in Tables 1 and 2.

#### ***FAST End of Year Comparison to District Proficiency Goals***

As seen in Table 1 and Table 2, each grade level is below the district's proficiency goal of 80% for each testing period. To understand end of year competency, spring of 2022 scores will be used in the following description to indicate how far below each grade level is from 80% proficient at the end of the school year. Kindergarten is 21% below; first grade is 28% below; second grade is 19% below; third grade is 17% below; fourth grade is 13% below; fifth grade is 18% below; and sixth grade is 21% below. This data indicates the greatest strength in fourth grade instruction with some strength in second and third grade instruction.

#### ***FAST Grade Level Beginning of Year to End of Year Comparison of Increase or Decrease in Proficiency***

As seen in Table 1 and Table 2, when comparing each grade level from their own fall 2021 scores to their spring 2022 scores, the following increases or decreases are noted: kindergarten decreased 10%; first grade decreased 2%; second grade increased 15%; third grade increased 6%; fourth grade increased 5%; fifth grade decreased 8%; and sixth grade decreased 6%. This data indicates the greatest instructional strength in second grade with third and fourth grades having some instructional strength.



**Table 1***East Elementary FAST Grade Level Proficiency Scores, Fall 2020-Spring 2022*

East	Fall 2020	Winter 2021	Spring 2021	Fall 2021	Winter 2022	Spring 2022
K	69%	75%	63%	69%	77%	59%
1st	45%	47%	47%	54%	56%	52%
2nd	53%	56%	61%	46%	54%	61%

*Note: Reprinted from ICSD Student Learning Goals (Erin Burmeister, personal communication, June 22, 2022)*

**Table 2***West Elementary FAST Grade Level Proficiency Scores, Fall 2020-Spring 2022*

West	Fall 2020	Winter 2021	Spring 2021	Fall 2021	Winter 2022	Spring 2022
3rd	55%	54%	61%	57%	65%	63%
4th	65%	66%	65%	62%	63%	67%
5th	71%	66%	69%	70%	62%	62%
6th	66%	63%	60%	65%	57%	59%

*Note: Reprinted from ICSD Student Learning Goals (Erin Burmeister, personal communication, June 22, 2022).*

**Table 3**

*Kindergarten through Sixth Grade FAST Assessment Proficiency Scores, Fall 2020-Spring 2022*

Grade Levels	Fall 2020	Winter 2021	Spring 2021	Fall 2021	Winter 2022	Spring 2022
K-6	61%	61%	61%	61%	62%	60%

*Note:* Reprinted from ICSD *Student Learning Goals* (Erin Burmeister, personal communication, June 22, 2022).

### **ISASP Data Analysis**

In Table 4, ISASP (Pearson Education, Inc, 2022) English language arts and math proficiency scores are presented for the spring of 2021 and spring of 2022, allowing a comparison of student scores from the two years and how they relate to the district’s proficiency goal of 80%. Scores in parentheses are the 2021 scores for that cohort of students. The numbers to the right of the parentheses are the goals set at each grade level for spring of 2022. The bolded numbers are the proficiency scores for spring of 2022. Per personal communication with Burmeister (June 22, 2022), third grade scores are not available for the spring of 2021, so a comparison of growth or decline is unavailable for the third-grade level.

#### ***ISASP End of Year Comparison to District Proficiency Goals***

As seen in Table 4, each grade level is below the district’s 2023 goal of 80% proficiency in both ELA and math. Third grade is 24% below for ELA and 16% below for math; fourth grade is 3% below for ELA and 16% for math; fifth grade is 10% below for both ELA and math; and sixth grade is 4% below for both ELA and math. This indicates instructional strengths in fourth grade for ELA and sixth grade for ELA and math instruction.

#### ***ISASP Year to Year Grade Level Comparison of Increase or Decrease in Proficiency***

From 2021 to 2022, fourth grade was able to increase student ELA proficiency scores by 21% and had a 0% change in math scores; fifth grade decreased ELA proficiency by 7% and math proficiency by 6%, sixth grade increased both ELA and math proficiency by 6%. This information shows strengths in fourth and sixth grade instruction and a weakness in fifth grade instruction.

**Table 4**

*Third through Sixth Grade ISASP Proficiency Scores, Spring 2021 and Spring 2022*

Current Grade Level	ELA (2021 scores) 2022 goals <b>2022 Score</b>	Math (2021 scores) 2022 goals <b>2022 Score</b>
3 <sup>rd</sup>	(--)-- <b>56%</b>	(--)-- <b>64%</b>
4 <sup>th</sup>	(49%) 55% <b>77%</b>	(64%) 70% <b>64%</b>
5 <sup>th</sup>	(80%) 82% <b>70%</b>	(70%) 76% <b>70%</b>
6 <sup>th</sup>	(75%) 80% <b>76%</b>	(70%) 75% <b>76%</b>

*Note:* Reprinted from ICSD *Student Learning Goals* (Erin Burmeister, personal communication, June 22, 2022)

## **Data Summary**

As indicated throughout the data analysis, ICSD's FAST (FastBridge, 2021) and ISASP (Pearson Education, Inc, 2022) proficiency scores suggest the district will not make their 80% proficiency goal for ELA and math by spring of 2023. The grade levels who have come the closest to this are fourth and sixth grades with only 3% and 4% discrepancy on their ISASP scores. In addition, both fourth and sixth grades can increase proficiency scores for their students from one grade level to the next, also indicating a strength in their instructional methods. In further analysis, two grade levels' end of the year FAST assessment scores increase in their grade level then drop in the next grade level, as seen in students going from kindergarten to first grade (FAST data) and students going from fourth grade to fifth grade (FAST and ISASP data). While all grade levels need support in meeting ICSD's 80% proficiency goal, further analysis of fourth and sixth grade instructional strategies is suggested as their scores imply their teaching methods have the most positive impact on student growth. In addition to exploring fourth and sixth grade strategies, further data analysis on ICSD's MAPs (NWEA, 2022) assessment scores would give greater indication to specific skills lacking in each grade level. Combining teaching strategies and MAPs scores will allow for deeper understanding of where the district's weaknesses lie.

## **Action Plan**

Originally, this school improvement plan was intended to address special education curriculum and instruction practices for writing IEPs in ICSD. However, the data analysis revealed a need in both special education and general education for curriculum and instruction practices. Due to this, the Action Plan includes all the educators of ICSD.

## **Impact on Teaching**

The teachers of ICSD are familiar with unpacking standards. They understand to unpack a standard they must identify what a student is able to do to be proficient. This is different from the teachers being able to develop learning progressions. Learning progressions are a pathway of learning from a student's baseline of knowledge to a more sophisticated level of understanding. Learning progressions may reflect CCSS (Common Core State Standards Initiative, 2021) from within one grade level or across them, depending on the need(s) of a student. To understand the process of building progressions, the teachers of ICSD must be explicitly taught how to do so (Heritage, 2008, Pierson et al., 2017).

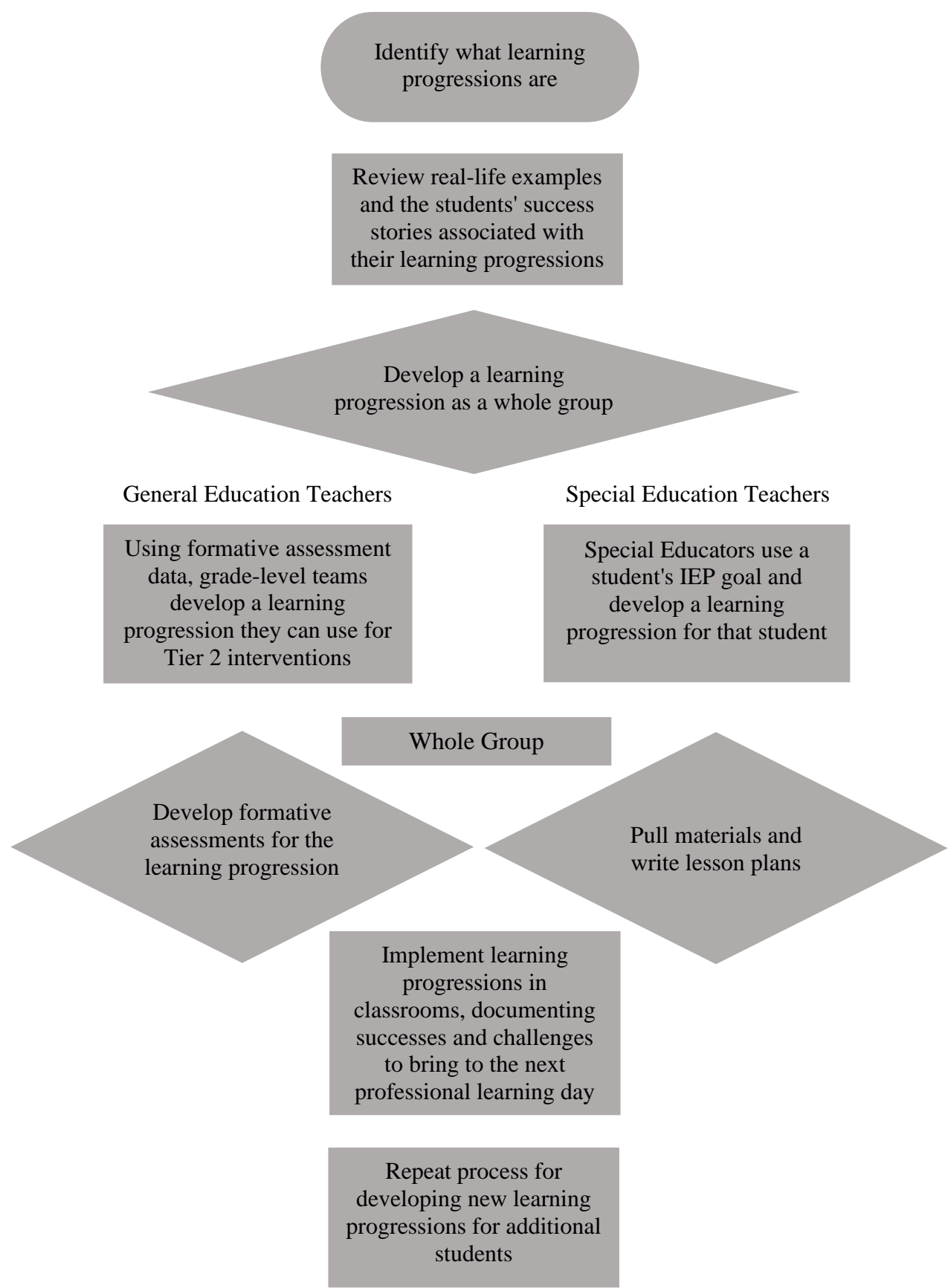
To front-load the teachers, professional development will begin with teaching the staff what learning progressions are and sharing authentic examples used with previous students. Whole group practice will then take place by developing a sample learning progression. From this point, professional learning will be centered around general education teams and special education teams being guided through the developing process in accordance with their Tier 2 formative assessment data and their student IEP goals. After the teachers have created their unique learning progressions, professional development will be centered around appropriate formative assessments within the learning progression and writing the lessons to coincide with the progressions. Teachers will be expected to implement the learning progressions immediately, documenting success and challenges. The next professional development will address the successes and challenges. In addition, the learning progression inventive process will be repeated for the teachers to improve their current learning progressions and craft additional progressions based on student needs. This continuous cycle will provide teachers support with mastering current grade-level standard knowledge, previous grade-level standard knowledge, the ability to easily build learning progressions, the ability to easily generate appropriate formative

assessments, the ability to easily pull resources, and the ability to easily script appropriate lesson plans for specific student achievement. Once this process is mastered, student classroom performance will increase, and growth will be visible on district assessments.

Figure 1 provides an overview of the professional development plan for how to teach and build learning progressions:

**Figure 1**

*Professional Development Plan for How to Develop Learning Progressions*



## **Implementation of School Improvement Plan**

### **Implementation Schedule**

Professional learning days for ICSD are every Friday of the school year. Most of the days focus on data analysis and PLC (About PLCs | All Things PLC | Powered by Solution Tree, 2006) time with some of the days held aside for professional development. Due to the focus of this school improvement plan around teachers analyzing student data and teacher growth around learning progressions, it qualifies for implementation on both PLC (About PLCs | All Things PLC | Powered by Solution Tree, 2006) days and professional development days. This plan will begin on September 2<sup>nd</sup> and run through the entire school year. It will not be limited to professional learning days as teachers may request additional support on building, implementing, and assessing learning progressions throughout various intervention cycles. After the first session of kindergarten through sixth grade formative assessments for FAST (FastBridge, 2021), IEP progress monitoring and development, or for general education reading, writing, or math curriculum-based assessments, or for behavior interventions, special education and general education teachers will be expected to bring classroom data for a student or students who require interventions to each PLC (About PLCs | All Things PLC | Powered by Solution Tree, 2006) or professional development day. This data provides the content of learning progressions the educators will design at those times.

### **Resources**

The primary resource for this school improvement plan is the CCSS (Common Core State Standards Initiative, 2021) under Iowa law. These standards will be the foundation of developing individualized learning progressions for core instruction. Iowa's Social-Emotional Competencies (Iowa Department of Education, 2022c) will be used in cases of behavior interventions. In



addition, current curriculums the district owns will be the central resources for designing instruction. New materials will not be purchased for this school improvement plan unless deemed necessary throughout the process. Finally, there will be a shared school district drive to house the developed learning progressions. Eventually, the shared drive will be a place where teachers can pull previous developed progressions and adapt them to their students' needs.

### **Stakeholders**

General education and special education teachers, the Director of School Improvement, the Student-Success Coordinator, principals, interventionists, and paraprofessionals will have opportunities to develop, implement, and/or monitor learning progressions.

### **Monitoring Effectiveness**

#### ***Student Growth***

The learning progressions' effectiveness will predominately be measured by student growth on classroom, IEP, and school district assessments throughout the school year. If a student is making growth like what they were prior to their learning progression being implemented, the learning progression was not designed correctly. Teachers will be able to frequently monitor growth through qualitative and quantitative data. This allows for instructional changes immediately when lack of growth is noted in student performance.

#### ***Staff Accountability***

To supervise the development of the learning progressions, the general education and special education teachers will submit their crafted learning progressions to a shared school district drive. The Director of School Improvement, the Student-Success Coordinator, principals, and interventionists will monitor the learning progressions for gaps and inadequacies. In addition, professional development days will be used for collaboration when developing learning

progressions. The Director of School Improvement, the Student-Success Coordinator, principals, and interventionists will guide the teachers on what materials to use for lesson development and how to implement the progressions. This will promote the PLC (About PLCs | All Things PLC | Powered by Solution Tree, 2006) culture with all staff having an investment in each learning progression and each student's success.

### **Barriers to Successful Implementation**

The greatest barrier will be convincing the special education and general education teachers learning progressions work and are not “the latest trend” in education. It will also take the teachers' willingness to study and learn the state standards outside of the grade level they teach. This part of designing learning progressions is time consuming and can feel overwhelming until a person can reference the standards easily. An additional challenge for the teachers will be getting comfortable with pulling resources and writing lesson plans that don't necessarily come from one curriculum. Teachers will not be left to tackle these challenges on their own. They will have administrative support, grade-level support, and time to complete the expectations of building rigorous, systematic, and intentional learning progressions for each student who needs one.

### **Conclusion**

Having a student-centered approach where the educator understands learning happens on a continuum, the educator can design instruction to be a process, and the educator knows how to diagnose discrepancies for appropriate interventions is essential to the achievement of a student. With the use of individualized learning progressions, students will have rigorous and relevant instruction to diminish learning discrepancies and increase classroom performance.

Originally, the purpose of this school improvement plan was to provide the Independence Community School District's 13.5% (Iowa Department of Education, 2021b) students with learning disabilities an influential program through the implementation and individualization of learning progressions. However, through academic research and learning more about the ICSD needs, it became apparent learning progressions would benefit all students requiring interventions and increase school proficiency goals.

Researchers have investigated, developed, and implemented learning progressions in the areas of reading, writing, English as a second language, math, and science to address specific needs (Bailey & Heritage, 2014; Duschl, 2019; Furtak & Heredia, 2014; Hovardas, 2016; Mosher & Heritage, 2017; Nelson et al., 2018; Osborne et al., 2016; Pierson et al., 2017; Shea & Duncan, 2013; van Rijn et al., 2014). Those learning progressions have proven to enhance student learning in both the general education and special education settings (Burns et al., 2020).

Further quantitative research on the effectiveness of learning progressions in both the general education and special education settings would provide numerical values and the possible implications for school districts' academic programs. In addition to addressing academic discrepancies, learning progressions may address social-emotional discrepancies, also requiring further research.

## References

About PLCs | All Things PLC | Powered by Solution Tree. (2006). About PLCs.

<https://www.allthingsplc.info/about>

Advameg, Inc. (2022). *Independence, Iowa (IA 50644) profile: population, maps, real estate, averages, homes, statistics, relocation, travel, jobs, hospitals, schools, crime, moving, houses, news, sex offenders*. City-Data. <http://www.city-data.com/city/Independence-Iowa.html>

Bailey, A. L., & Heritage, M. (2014). The role of language learning progressions in improved instruction and assessment of English language learners. *TESOL Quarterly*, 48(3), 480–506. <https://doi.org/10.1002/tesq.176>

Battelle for Kids. (2022). *Portrait of a Graduate*. Portrait of a Graduate.

<https://portraitofagraduate.org>

Burns, M. K., Maki, K. E., Brann, K. L., McComas, J. J., & Helman, L. A. (2020). Comparison of reading growth among students with severe reading deficits who received intervention to typically achieving students and students receiving special education. *Journal of Learning Disabilities*, 53(6), 444–453. <https://doi.org/10.1177/0022219420918840>

Bingham, C. B., & Davis, J. P. (2012). Learning sequences: Their existence, effect, and evolution. *Academy of Management Journal*, 55(3), 611–641.

<https://doi.org/10.5465/amj.2009.0331>

Childress, J., Backman, A. C., & Lipson, M. Y. (2019). Reframing literacy assessment: Using scales and micro-progressions to provide equitable assessments for all learners. *Journal of Adolescent & Adult Literacy*, 63(4), 371–377. <https://doi.org/10.1002/jaal.1016>

- Common Core State Standards Initiative. (2021). *Standards in Your State | Common Core State Standards Initiative*. <http://www.corestandards.org/standards-in-your-state/>
- Duckor, B., & Holmberg, C. (2019). Exploring how to model formative assessment trajectories of posing-pausing-probing practices: Toward a teacher learning progressions framework for the study of novice teachers. *Journal of Educational Measurement*, 56(4), 836–890. <https://doi.org/10.1111/jedm.12239>
- Duschl, R. A. (2019). Learning progressions: framing and designing coherent sequences for STEM education. *Disciplinary and Interdisciplinary Science Education Research*, 1(1). <https://doi.org/10.1186/s43031-019-0005-x>
- Eisner, E. W., & Rehage, K. J. (Eds.). (1985). *Learning and teaching the ways of knowing: eighty-fourth yearbook of the National Society for the Study of Education, Pt. 2*.
- FastBridge. (2021, April 13). *FastBridge - One Simple Formative Assessment Solution*. <https://www.fastbridge.org/>
- Furtak, E. M., & Heredia, S. C. (2014). Exploring the influence of learning progressions in two teacher communities. *Journal of Research in Science Teaching*, 51(8), 982–1020. <https://doi.org/10.1002/tea.21156>
- Hammer, D., & Sikorski, T. R. (2015). Implications of complexity for research on learning progressions. *Science Education*, 99(3), 424–431. <https://doi.org/10.1002/sce.21165>
- Heinemann. (2021). *Overview - What is the Classroom Workshop Model*. Lucy Calkins and Colleagues Units of Study. <https://www.unitsofstudy.com/introduction>
- Heritage, M. (2008). Learning progressions: Supporting instruction and formative assessment. *National Center for Research on Evaluation, Standards and Student Testing (CRESST)*, 1–30.

[http://169.62.82.226/documents/mde/CCSSO\\_Learning\\_Progressions\\_Mararget\\_Heritage\\_1\\_601110\\_7.pdf](http://169.62.82.226/documents/mde/CCSSO_Learning_Progressions_Mararget_Heritage_1_601110_7.pdf)

Hovardas, T. (2016). A learning progression should address regression: Insights from developing non-linear reasoning in ecology. *Journal of Research in Science Teaching*, 53(10), 1447–1470. <https://doi.org/10.1002/tea.21330>

Illustrative Mathematics. (2021, July 21). *Illustrative Mathematics | K-12 Math | Resources for Teachers & Students*. Illustrative Mathematics K–12 Math.

<https://illustrativemathematics.org>

Independence Community School District. (2022a, May 10). *Our Schools*.

<https://www.indeek12.org/our-schools/>

Independence Community School District. (2022b, May 11). *Clubs & Organizations*.

<https://www.indeek12.org/activities/clubs-organizations/>

Independence Community School District. (2022c, May 11). *Fine Arts*.

<https://www.indeek12.org/activities/fine-arts/>

Independence Community School District. (2022d, May 20). *Parent Teacher Organization*

(PTO). <https://www.indeek12.org/parent-student-info/parent-teacher-organization-pto/>

Independence Community School District. (2022e, June 22). *Home*. <https://www.indeek12.org>

Independence, Iowa Area Chamber of Commerce. (2022). *City Demographics*. Independence

Area Chamber of Commerce. <https://www.indeecommerce.com/work/city-demographics/>

Iowa Department of Education. (2021a). *Independence Central Rivers AEA*.

<https://www.iaschoolperformance.gov/ECP/StateDistrictSchool/DistrictSummary?k=803>

[1&y=2021](https://www.iaschoolperformance.gov/ECP/StateDistrictSchool/DistrictSummary?k=803)

Iowa Department of Education. (2021b, December 17). *Special Education (IEP) Enrollment*.

<https://educateiowa.gov/document-type/special-education-iep-enrollment>

Iowa Department of Education. (2022c). *Social-Emotional Learning*.

<https://educateiowa.gov/pk-12/learner-supports/social-emotional-learning>

Iowa Department of Education. (2022d, March 7). *Iowa's high school graduation rate is 90.2*

*percent*. <https://educateiowa.gov/article/2022/03/07/iowa-s-high-school-graduation-rate-902-percent>

Jin, H., Mikeska, J. N., Hokayem, H., & Mavronikolas, E. (2019). Toward coherence in curriculum, instruction, and assessment: A review of learning progression

literature. *Science Education*, 103(5), 1206–1234. <https://doi.org/10.1002/sce.21525>

Mosher, F., & Heritage, M. (2017). *A Hitchhiker's Guide to Thinking about Literacy, Learning Progressions, and Instruction* (No. RR2017-2). Consortium for Policy Research in Education.

[https://repository.upenn.edu/cgi/viewcontent.cgi?article=1098&context=cpre\\_researchreports](https://repository.upenn.edu/cgi/viewcontent.cgi?article=1098&context=cpre_researchreports)

Nelson, P. M., Parker, D. C., & van Norman, E. R. (2018). Subskill mastery among elementary and middle school students at risk in mathematics. *Psychology in the Schools*, 55(6),

722–736. <https://doi.org/10.1002/pits.22143>

NWEA. (2022, May 26). *MAP Growth: Precisely measure student growth and performance*.

<https://www.nwea.org/map-growth/>

Osborne, J. F., Henderson, J. B., MacPherson, A., Szu, E., Wild, A., & Yao, S. Y. (2016). The development and validation of a learning progression for argumentation in

science. *Journal of Research in Science Teaching*, 53(6), 821–846.

<https://doi.org/10.1002/tea.21316>

Pearson Education, Inc. (2022). *Iowa / Home*. ISASP Iowa Statewide Assessment of Student Progress. <https://iowa.pearsonaccess.com>

Pierson, A. E., Clark, D. B., & Sherard, M. K. (2017). Learning progressions in context:

Tensions and insights from a semester-long middle school modeling curriculum. *Science Education*, 101(6), 1061–1088. <https://doi.org/10.1002/sce.21314>

Public School Review. (2022, June 12). *Independence Community School District (2022) /*

*Independence, IA*. <https://www.publicschoolreview.com/iowa/independence-community-school-district/1914580-school-district>

Ragupathi, K., & Lee, A. (2020). Beyond fairness and consistency in grading: The role of rubrics in higher education [E-book]. In C. S. Sanger & N. W. Gleason (Eds.), *Diversity and inclusion in global higher education* (pp. 73–96). Springer Publishing.

<https://library.oopen.org/bitstream/handle/20.500.12657/23168/1006985.pdf?sequence=1#page=87>

Shea, N. A., & Duncan, R. G. (2013). From theory to data: The process of refining learning progressions. *Journal of the Learning Sciences*, 22(1), 7–32.

<https://doi.org/10.1080/10508406.2012.691924>

U.S. Department of Commerce. (2021). *U.S. Census Bureau QuickFacts: Independence city, Iowa*. Census Bureau QuickFacts.

<https://www.census.gov/quickfacts/fact/table/independencecityiowa/SBO040212>



- van Rijn, P. W., Graf, E. A., & Deane, P. (2014). Empirical recovery of argumentation learning progressions in scenario-based assessments of English language arts. *Psicología Educativa*, 20(2), 109–115. <https://doi.org/10.1016/j.pse.2014.11.004>
- Wolfson, A. J. (2019). Teaching progressions and learning progressions. *Biochemistry and Molecular Biology Education*, 47(5), 493–497. <https://doi.org/10.1002/bmb.21286>

## Appendix