LINDSAY UNIFIED
SCHOOL DISTRICT

SUMMIt PUBLIC SCHooLS

Transcend

Look Fors

RESEARCH AND CONSTRUCTION

OCTOBER 2018

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RESEARCH AND DRAFTING PROCESS

While many recognize personalized learning as a new and dramatically different instructional model, the ideas in this resource are supported by extensive research on effective teaching and how people best learn as well as by the applied knowledge of Lindsay Unified School District and Summit Public Schools. In order to make sure the *Instructional Look Fors* effectively built on all of these sources, the team worked with Columbia University's Center for Public Research and Leadership (CPRL) and Transcend to systematically compare the instructional tools currently used by Lindsay and Summit with an extensive review of literature on key teaching and learning topics. This process was iterative and involved moving back and forth between the two school systems' models and external research, as well as continuously reviewing and revising drafted content.

Throughout the process, we followed a few key steps.

First, we identified comparable material from both school systems so we could compare it. In the case of Summit, the system was already in the process of developing an extensive set of classroom and planning "*Look Fors*" statements and these became a key resource in the development of the *Instructional Look Fors*. Lindsay was developing a set of over 40 rubrics describing what is expected of Learning Facilitators. The descriptor statements from these rubrics also became key resources, specifically the descriptors for "Level 3" or "Proficient" performance. CPRL compared these statements so the team could identify key areas of convergence and divergence. This comparison, and the subsequent discussions it prompted, led to the development of the six Principles that define personalized learning.

The next step in the research and drafting process was an extensive review of literature related to each of the Principles. The purpose of this review was to answer three overarching questions.
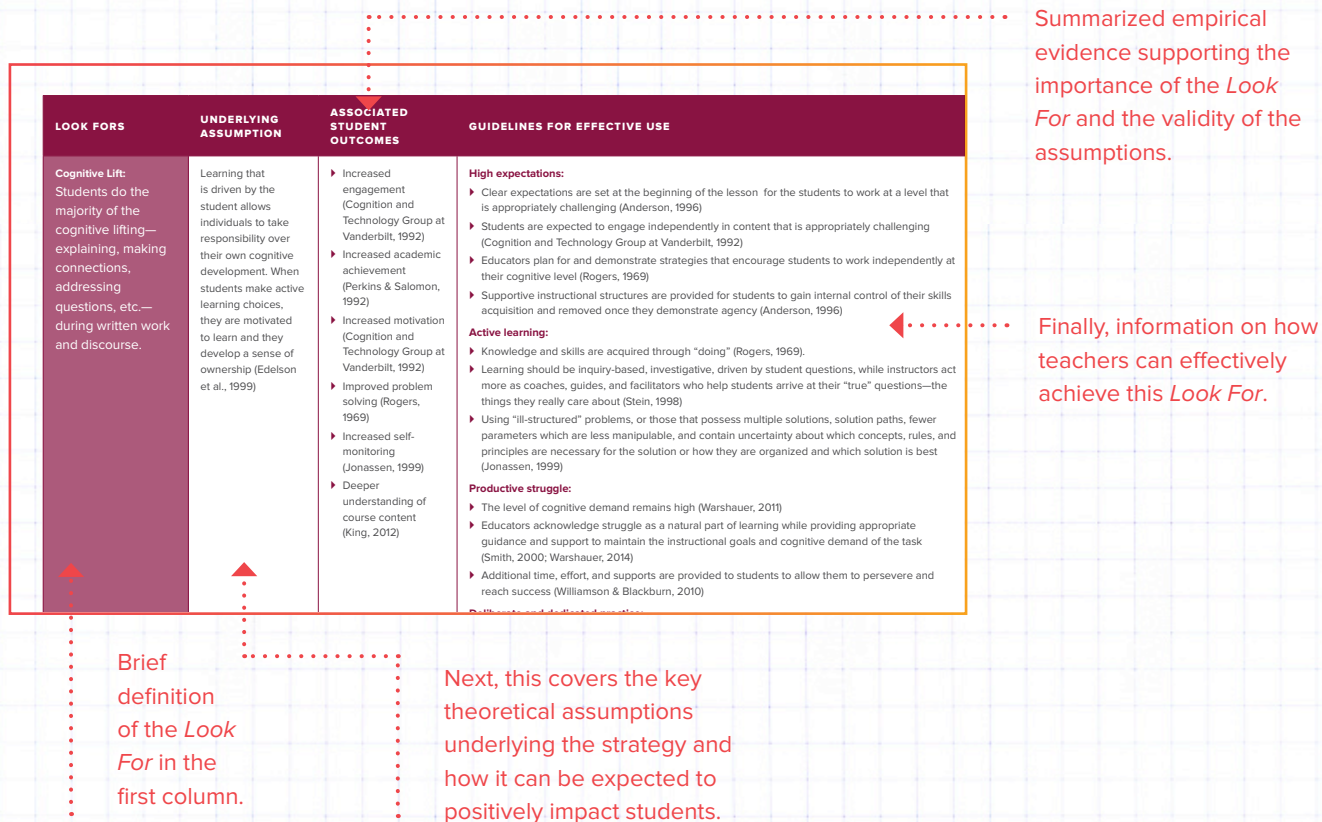
1. **How is each Principle defined in existing research and what are key concepts related to it?**

2. **What hypothesized or evidence-based impacts can the Principles and related concepts have on student outcomes?**

3. **What are the key guiding principles or strategies for effectively employing the Principle and related concepts?**

To answer these questions, we reviewed general literature on student-centered, self-directed, and personalized learning along with literature on specific Principles and the various concepts and ideas that relate to them. This research was used to establish the strategies linked to each *Look For*. While correlational, quasi-experimental, and experimental studies demonstrating the impact of different parts of the *Look Fors* were a crucial part of the literature review, we also reviewed theoretical writing and content developed specifically for practitioners.

The final step called for a synthesis of the previous two steps in order to draft the *Instructional Look Fors*. This synthesis involved first organizing all the statements from Lindsay and Summit related to the Principles and Subconcepts guiding this resource into groups. These statements were then compared with one another and with external research to inform the creation of a new *Look For* that was a hybrid of all three sources of information. In some cases, Lindsay and Summit did not have existing content related to a Subconcept, so *Look Fors* were created exclusively from research.

ORGANIZATION OF RESEARCH SUMMARIES

This section contains summaries of the research that inform the *Look Fors* and an explanation of how this research, as well as current Lindsay and Summit materials, were used to construct the *Instructional Look Fors*. Each section starts with a short overview paragraph that summarizes the literature reviewed at a very general level and introduces the Subconcepts. This paragraph is followed by a table that discusses each Subconcept and its related research in more detail across three columns. The first contains theoretical research that informs the assumption behind how the subconcept will positively impact students, the second contains empirical evidence supporting these assumptions, and the third provides educator-focused strategies for how to foster the subconcept. The image below demonstrates this organization.

Summarized empirical evidence supporting the importance of the *Look For* and the validity of the assumptions.

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Cognitive Lift: Students do the majority of the cognitive lifting—explaining, making connections, addressing questions, etc.—during written work and discourse.	Learning that is driven by the student allows individuals to take responsibility over their own cognitive development. When students make active learning choices, they are motivated to learn and they develop a sense of ownership (Edelson et al., 1999)	▸ Increased engagement (Cognition and Technology Group at Vanderbilt, 1992) ▸ Increased academic achievement (Perkins & Salomon, 1992) ▸ Increased motivation (Cognition and Technology Group at Vanderbilt, 1992) ▸ Improved problem solving (Rogers, 1969) ▸ Increased self-monitoring (Jonassen, 1999) ▸ Deeper understanding of course content (King, 2012)	**High expectations:** ▸ Clear expectations are set at the beginning of the lesson for the students to work at a level that is appropriately challenging (Anderson, 1996) ▸ Students are expected to engage independently in content that is appropriately challenging (Cognition and Technology Group at Vanderbilt, 1992) ▸ Educators plan for and demonstrate strategies that encourage students to work independently at their cognitive level (Rogers, 1969) ▸ Supportive instructional structures are provided for students to gain internal control of their skills acquisition and removed once they demonstrate agency (Anderson, 1996) **Active learning:** ▸ Knowledge and skills are acquired through "doing" (Rogers, 1969). ▸ Learning should be inquiry-based, investigative, driven by student questions, while instructors act more as coaches, guides, and facilitators who help students arrive at their "true" questions—the things they really care about (Stein, 1998) ▸ Using "ill-structured" problems, or those that possess multiple solutions, solution paths, fewer parameters which are less manipulable, and contain uncertainty about which concepts, rules, and principles are necessary for the solution or how they are organized and which solution is best (Jonassen, 1999) **Productive struggle:** ▸ The level of cognitive demand remains high (Warshauer, 2011) ▸ Educators acknowledge struggle as a natural part of learning while providing appropriate guidance and support to maintain the instructional goals and cognitive demand of the task (Smith, 2000; Warshauer, 2014) ▸ Additional time, effort, and supports are provided to students to allow them to persevere and reach success (Williamson & Blackburn, 2010) Deliberate and dedicated practice:

Finally, information on how teachers can effectively achieve this *Look For*.

Brief definition of the *Look For* in the first column.

Next, this covers the key theoretical assumptions underlying the strategy and how it can be expected to positively impact students.

Rigor

RESEARCH SUMMARY

Students stretch themselves intellectually and personally by engaging with skills, habits, and content in challenging, developmentally appropriate ways.

Rigor begins with a commitment to the belief that each individual is capable of learning at high levels (Blackburn, 2012). These high levels of learning reflect the furthest extents of Bloom's, Webb's, and Marzano's educational taxonomies, and are affirmed by high expectations that set students up for success (Bloom, 1975; Webb, 1997; Marzano, 2000). Students learn best when they are supported and provided with opportunities to demonstrate mastery by showing they can apply what they have learned at these high levels (Williamson & Blackburn, 2010; Wagner, 2008). In effective rigorous classrooms, students take the lead on their own cognitive development by actively and passionately engaging in the work of learning (Prince, 2004; Hattie, 2009). This prepares students to deeply understand complex content, and develops the skills and habits needed to think at the higher levels of Bloom's Taxonomy, including analysis, synthesis, and evaluation (Bloom, 1975; National Research Council, 2001). Ultimately, Rigor equips students to attain mastery of learning that can be transferred and applied across academic and real-world contexts. These concepts are synthesized into the following sub-elements that together make up Rigor:

- ▶ **Cognitive Lift:** Students do the majority of the cognitive lifting—explaining, making connections, addressing questions, etc.—during written work and discourse.

- ▶ **Higher-Order Thinking:** Students employ higher-order thinking skills such as applying, analyzing, evaluating, and creating to complete learning activities.

- ▶ **Essential Knowledge:** Students engage deeply with complex and challenging facts and concepts that build a meaningful foundation of knowledge.

- ▶ **Social Emotional Habits:** Students consciously apply they key social emotional habits necessary for lifelong success to their interpersonal and intrapersonal activities.

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Cognitive Lift: Students do the majority of the cognitive lifting—explaining, making connections, addressing questions, etc.—during written work and discourse.	Learning that is driven by the student allows individuals to take responsibility over their own cognitive development. When students make active learning choices, they are motivated to learn and they develop a sense of ownership (Edelson et al., 1999).	▶ Motivation (Cognition and Technology Group at Vanderbilt, 1992) ▶ Engagement (Cognition and Technology Group at Vanderbilt, 1992) ▶ Academic achievement (Perkins & Salomon, 1992) ▶ Improved problem solving (Rogers, 1969) ▶ Increased self-monitoring (Jonassen, 1999) ▶ Deeper understanding of course content (King, 2012)	**Set high expectations:** ▶ Clear expectations should be set at the beginning of the lesson to prompt students to work at a level that is appropriately challenging (Anderson, 1996; Cognition and Technology Group at Vanderbilt, 1992). ▶ Instructional supports should be provided so students experience a sense of internal control over skill acquisition and these supports should be removed once students demonstrate sufficient mastery (Anderson, 1996). **Create opportunities for active learning:** ▶ Knowledge and skills should be acquired through "doing" (Rogers, 1969). ▶ Learnng should be inquiry-based, investigative, and driven by student questions. Instructors then act more as coaches, guides, and facilitators who help students arrive at their "true" questions—the things they really care about (Stein, 1998). ▶ Problems should be "ill-structured." Meaning they have multiple solutions and solution paths; fewer parameters which are less manipulable; and/or contain uncertainty about which concepts, rules, and principles are necessary for the solution or how they are organized and which solution is best (Jonassen, 1999). **Encourage productive struggle:** ▶ The level of cognitive demand should remain high (Warshauer, 2011). ▶ Educators should acknowledge struggle as a natural part of learning while providing appropriate guidance and support to maintain the instructional goals and cognitive demand of the task (Smith, 2000; Warshauer, 2014). ▶ Educators should provide additional time and support to students to allow them to persevere and reach success (Williamson & Blackburn, 2010). **Ensure deliberate and dedicated practice:** ▶ Practice should go beyond passive reading, listening, or watching in order to build useful, lasting understanding and skill (Hiebert & Grouws, 2007). ▶ Students should engage in high-quality practice. Practice is most effective when it is spaced out, repeated at various intervals, and at the appropriate level (Hattie, 2009).

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Higher-Order Thinking: Students employ higher-order thinking skills such as applying, analyzing, evaluating, and creating to complete learning activities.	Students doing the lift facilites greater cognitive and metacognitive development. A student's ability to analyze and synthesize aspects of the learning experience, and/or to evaluate learning materials indicates a high level of complexity and abstraction in their learning (Bloom, 1956). Students who engage in higher order thinking are able to direct their attention to appropriate aspects of a problem and adequately utilize their background knowledge. The method of information acquisition also defines the level of a student's thinking skills (Anderson, 1996).	▸ Academic achievement (Rogers, 1969) ▸ Motivation (Cognition and Technology Group at Vanderbilt, 1992) ▸ Self-regulation (Rogers, 1969) ▸ Initiative (Rogers, 1969)	**Plan for higher-level questioning:** ▸ Questions should be open-ended and at the higher levels of Bloom's Taxonomy (analysis & synthesis) (Williamson & Blackburn, 2010). ▸ Teachers should push students to respond at high levels by asking extending questions then probing and guiding students to appropriate answers before moving on (Blackburn, 2012). **Develop interdisiplinary thinking skills:** ▸ Learning should focus on skills that will allow students to become "productive citizens who contribute to solving some of the most pressing issues we face" and who thrive in a collaborative environment (Wagner, 2008b). ▸ Curriculum, learning experiences, and questions can be planned using a cognitive rigor matrix (Hess, 2006). ▸ Students should be exposed to novel and complex activities on a regular basis (Hess et al., 2009). ▸ The prerequisite skills for the specific content area should be shared explicitly with the students (Cognition and Technology Group at Vanderbilt, 1992). ▸ Connections should be drawn between skills and their application in a task (Cognition and Technology Group at Vanderbilt, 1992). ▸ Thinking should made visible by educators and students and relevant feedback should be given on the process of learning (Jonassen, 1999). ▸ Students should be encouraged to reflect on and evaluate their own learning process and outcomes, including the application of skills (Jonassen, 1999).

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Essential Knowledge: Students engage deeply with complex and challenging facts and concepts that build a meaningful foundation of knowledge.	The cognitive lift carried out by students is characterized by attentive use of an expansive knowledge base. The application of well-organized, domain-specific knowledge is needed to prompt skill and knowledge transfer (Jonassen, 1999).	▸ Participation (Ugur et al., 2015) ▸ Deeper engagement (Cognition and Technology Group at Vanderbilt, 1992) ▸ Leadership in learning (Rogers, 1969) ▸ Academic performance (Perkins & Salomon, 1992)	**Support mastery of content knowledge and skills:** ▸ Competency-based standards that align with and build on state learning standards for subject-matter proficiency can be used (Abbott, 2014). ▸ The skills and learning styles of each student should be known by educators to help with the choice of appropriate strategies for developing content understanding (Cognition and Technology Group at Vanderbilt, 1992) ▸ Students should be encouraged to make connections between general concepts and content-area-specific knowledge (King et al., 2008). ▸ Gaps in knowledge should be treated in a positive way (iNACOL, 2014).
Social Emotional Habits: Students consciously apply key social emotional habits necessary for lifelong success to their interpersonal and intrapersonal activities.	Social emotional habits—such as self-awareness, empathy, self-regulation, etc.—support students in functioning as individuals as well as in working collaboratively (Domitrovich et al., 2017).	▸ Manage behavior (Trentacosta & Fine, 2010) ▸ Set and achieve positive goals (Weissberg et al., 2015) ▸ Establish and maintain positive relationships (Weissberg et al., 2015)	**Integrate explicit instruction and modeling:** ▸ Explicit instruction should be provided through a sequence of lessons focused on specific habits (Collaborative for Academic, Social, and Emotional Learning, 2015). ▸ Educators should model habits or incorporate demonstrations of habits in action, for example through video (Collaborative for Academic, Social, and Emotional Learning, 2015). **Ensure opportunities to practice and recieve feedback:** ▸ Students should have opportunities to practice habits, for example through role play (Dusenbury et al., 2015b; Collaborative for Academic, Social, and Emotional Learning, 2015). ▸ Students should receive feedback from adults and/or peers to encourage improvement and mastery (Collaborative for Academic, Social, and Emotional Learning, 2015). **Create a socially and emotionally positive and supportive culture:** ▸ Positive relationships should be fostered between teachers, students, and staff (Thapa et al., 2013; Dusenbury et al., & Weissberg, 2015; Collaborative for Academic, Social, and Emotional Learning, 2015). ▸ A physically and psychologically safe environment should be created (Thapa et al., 2013; Dusenbury et al., 2015a; Dusenbury et al., 2015b; Collaborative for Academic, Social, and Emotional Learning, 2015).

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Social Emotional Habits, continued	Social emotional habits support many key learning processes, including metacognitive thinking, self-directed learning, collaboration, and more (Weissberg et al., 2015). Social emotional habits buffer students against risky behavior and trauma (Luthar et al., 2000; Elias & Haynes, 2008; Valiente et al., 2011).	▸ Make responsible decisions (Epstein et al., 2000; Weissberg et al., 2015; Heckman et al., 2006; Moffitt et al., 2011) ▸ Academic achievement (Durlak et al., 2011) ▸ Career success (Heckman et al., 2006; Moffitt et al., 2011) ▸ Physical health and avoidance of unhealthy behaviors (Moffitt et al., 2011; Jones et al., 2015)	▸ A culture of respect, diversity, and civic-mindedness should be developed (Thapa et al., 2013; Dusenbury et al., 2015; Collaborative for Academic, Social, and Emotional Learning, 2015).

Rigor RESEARCH SUMMARY

REFERENCES

Abbott, S. (Ed.). (2014, August 26). The hidden curriculum. *The glossary of education reform*. Retrieved from http://edglossary.org/hidden-curriculum.

Anderson, J.R. (1996). ACT: A simple theory of complex cognition. *American Psychologist, 51*(4), 355-365.

Blackburn, B. (2008). *Rigor is not a four-letter word.* Larchmont, NY: Eye on Education.

Blackburn, B. (2012). *Rigor made easy: Getting started.* Larchmont, NY: Eye on Education.

Bloom, B.S. (1975). *Taxonomy of educational objectives: Book 1 cognitive domain*. New York, NY: Longman.

Cognition and Technology Group at Vanderbilt. (1992). Anchored instruction in science and mathematics: Theoretical basis, developmental projects, and initial research findings. In R. A. Duschl & R. J. Hamilton (Eds.), *Philosophy of science, cognitive psychology, and educational theory and practice* (pp. 244-273). Albany, NY: SUNY Press.

Collaborative for Academic, Social, and Emotional Learning. (2015). Effective social and emotional learning programs: Middle and high school edition. Retrieved from http://secondaryguide.casel.org/casel-secondary-guide.pdf.

Domitrovich, C.E., Durlak, J. A., Staley, K. C., & Weissberg, R. P. (2017). Social-emotional competence: An essential factor for promoting positive adjustment and reducing risk in school children. *Child Development, 88*(2), 408-416.

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development, 82*(1), 405-432.

Dusenbury, L., Calin, S., Domitrovich, C. E., & Weissberg, R. P. (2015a). What does evidence-based instruction in social and emotional learning actually look like in practice? Chicago, IL: Collaborative for Academic, Social, and Emotional Learning.

Dusenbury, L.A., Newman, J. Z., Weissberg, R. P., Goren, P., Domitrovich, C. E., & Mart, A. K. (2015b). The case for preschool through high school state learning standards for SEL. In J. A. Durlak, C. E. Domitrovich, R. P. Weissberg, & T. P. Gullotta (Eds.), *Handbook of social and emotional learning: Research and practice* (pp. 532-548). New York, NY: Guilford.

Edelson, D.C., Gordin, D. N., & Pea, R. D. (1999). Addressing the challenges of inquiry-based learning through technology and curriculum design. *Journal of the Learning Sciences, 8*(3-4): 391-450.

Elias, M.J., & Haynes, N. M. (2008). Social competence, social support, and academic achievement in minority, low-income, urban elementary school children. *School Psychology Quarterly, 23*(4), 474-495.

Epstein, J.A., Griffin, K. W., & Botvin, G. J. (2000). Competence skills help deter smoking among inner city adolescents. *Tobacco Control, 9*(1), 33-39.

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement.* London: Routledge.

Heckman, J.J., Stixrud, J., & Urzua, S. (2006). The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. J*ournal of Labor Economics, 2006*(24), 411-482.

Hess, K. (2006a). Applying Webb's Depth-of-Knowledge (DOK) Levels in science. Retrieved from http://www.nciea.org/publications/DOKscience_KH08.pdf.

Hess, K. (2006b). Exploring cognitive demand in instruction and assessment. Retrieved from http://www.nciea.org/publications/DOK_ApplyingWebb_KH08.pdf.

Hess, K.K., Jones, B. S., Carlock, D., Walkup, J. R. (2009). Cognitive rigor: Blending the strengths of Bloom's Taxonomy and Webb's Depth of Knowledge to enhance classroom-level processes. Online submission. Retrieved from https://eric.ed.gov/?id=ED517804.

Hiebert, J., & Grouws, D. (2007). The effects of classroom mathematics teaching on students' learning. In F. K. Lester (Ed.). *Second Handbook of research on mathematics teaching and learning* (pp. 371-404). Greenwich, CT: Information Age.

January, A. M., Casey, R.J., & Paulson, D. (2011). A meta-analysis of classroom-wide interventions to build social skills: Do they work? *School Psychology Review, 40*(2), 242-256.

Jonassen, D.H. (1999). Instructional design models for well-structured and ill-structured problem-solving learning outcomes. *Educational Technology Research and Development, 45*(1): 65-94.

Jones, D.E., Greenberg, M., & Crowley, M. (2015). Early social-emotional functioning and public health: The relationship between kindergarten social competence and future wellness. *American Journal of Public Health, 105*(11), 2283-2290.

King, D.T. (2012). New perspectives on context-based chemistry education: using a dialectical sociocultural approach to view teaching and learning. *Studies in Science Education, 48*(1), 51-87.

King, D., Bellocchi, A., & Ritchie, S. (2008). Making Connections: Learning and teaching in context. *Research in Science Education, 38*(3), 365-384.

Korpershoek, H., Harms, T., de Boer, H., van Kuijk, M., & Doolaard, S. (2016). A meta-analysis of the effects of classroom management strategies and classroom management programs on students' academic, behavioral, emotional, and motivational outcomes. *Review of Educational Research, 86*(3), 643-680.

Luthar, S.S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development, 71*(3), 543-562.

Marzano, R.J. (2000). A new era of school reform: Going where the research takes us. Aurora, CO: Mid-Continent Research for Education and Learning.

Marzano, R.J., Pickering, D., & Pollock, J. E. (2001). Classroom instruction that works: Research-based strategies for increasing student achievement. Alexandria, Va: Assoc. for Supervision and Curriculum Development.

Moffitt, T. E. et al. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences of the United States of America, 108*(7), 2693-2698.

National Research Council. (2001). Pellegrino, J., Chudowsky, N., & Glaser, R. (Eds.) *Knowing what students know: The science and design of educational assessment.* Washington, D.C.: Academy Press.

Prince, M. (2004). Does active learning work? A review of the research. *Journal of engineering education, 93*(3): 223-231.

Perkins, D. N., Salomon, G. (1992). Transfer of learning. *The International Encyclopedia of Education, 2*(1). Oxford, England: Pergamon Press.

Rogers, C. (1969). *Freedom to learn*. Columbus, OH: Merrill.

Smith, M. (2000). Reflection on practice: Redefining success in mathematics teaching and learning. *Mathematics Teaching in the Middle School, 5*(6), 378-82.

Sklad, M., Diekstra, R., Ritter, M. D., Ben, J., & Gravesteijn, C. (2012). Effectiveness of school based universal social, emotional, and behavioral programs: Do they enhance students' development in the area of skill, behavior, and adjustment? *Psychology in the Schools, 49*(9), 892-909.

Stein, D. (1998). Situated learning in adult education. ERIC Digest, 195. Washington, DC: ERIC Clearinghouse.

Thapa, A., Cohen, J., Guffey, S., & Higgins-D'Alessandro, A. (2013). A review of school climate research. *Review of Educational Research, 83*(3), 357-385.

Trentacosta, C. J., & Fine, S. E. (2010). Emotion knowledge, social competence, and behavior problems in childhood and adolescence: A meta-analytic review. *Social Development, 19*(1), 1-29.

Ugur, H., Constantinescu, P.M., & Stevens, M.J. (2015). Self-awareness and personal growth: Theory and application of Bloom's Taxonomy. Eurasian Journal of Educational Research, 60: 89-110.

Valiente, C., Eisenberg, N., Haugen, R., Spinrad, T. L., Hofer, C., Liew, J., & Kupfer, A. (2011). Children's effortful control and academic achievement: Mediation through social functioning. Early Education and Development, 22, 411-433.

Wagner, T. (2008a). The global achievement gap: Why even our best schools don't teach the new survival skills our children need—and what we can do about it. New York: Basic Books.

Wagner, T. (2008b). Rigor Redefined. Educational Leadership, 66(2), 20-24.

Warshauer, H. K. (2011). The role of productive struggle in teaching and learning middle school mathematics (Unpublished dissertation). The University of Texas at Austin, Austin, TX.

Webb, N. (1997). Criteria for alignment of expectations and assessments on mathematics and science education. National Science Foundation Research Monograph No. 6. Washington, D.C.: CCSSO.

Webb, N. (1999). Alignment of science and mathematics standards and assessments in four states. National Science Foundation Research Monograph No. 18. Washington, D.C.: CCSSO.

Weissberg, R. P., Durlak, J. A., Domitrovich, C. E., & Gullotta, T. P. (2015). Social and emotional learning: Past, present, and future. In J. A. Durlak, C. E. Domitrovich, R. P. Weissberg, & T. P. Gullotta (Eds.), Handbook of social and emotional learning: Research and practice (pp. 3-19). New York, NY: Guilford.

Williamson, R. and Johnston, J. H. (1999). Challenging orthodoxy: An emerging agenda for middle level reform. Middle School Journal, 30(4), 10-17.

Williamson, R. and Blackburn, B. (2010). Four Myths About Rigor in the Classroom. Larchmont, NY: Eye on Education.

Wyatt, J.N., Wiley, A., Camara, W.J. and Proestler, N. (2011). The Development of an Index of Academic Rigor for College Readiness: Research Report. New York, NY: The College Board.

Customization

RESEARCH SUMMARY

Students engage in experiences tailored to their interests, needs, and specific developmental levels.

Defining Customization

C2D2 has chosen to use the term "customization" to describe an overall learning experience which is tailored to the readiness and preferences of individuals. This term embodies a suite of actions and conditions that are interrelated but not completely codified in practice or research. Customization incorporates aspects of individualization and differentiation, which respectively refer to instruction paced to the learning needs of different learners, and instruction tailored to the learning preferences of different learners (Hattie, 2009; US Department of Education, 2010). Like these established approaches, customization aims to serve as an alternative to a "one-size-fits-all" model of teaching and learning, wherein students receive standardized instruction and assessment in traditional classroom settings (Tomlinson, 2015; Tomlinson & Strickland, 2005; Yonezawa, 2012). Customization encompasses the practices and strategies denoted by these terms, but differs in its inclusion of a focus on approaches that vary responsively according to contexts and stakeholders, like competency-based progression and learner-driven instruction (Seel, 2012; Mohammed, 2016; Pane et al. 2015). **Appropriately challenging** learners is a primary theme in the literature, which explicitly deals with customizing in order to reach and push students at varying developmental levels, an idea with roots in Vygotsky's concept of the zone of proximal development (ZPD). Responsivity to individual level of development relates to the underlying theories of differentiation and mixed-ability teaching by making adjustments that cater to learners' needs, but goes further to utilize individualized learning trajectories to engage the upper limits of learners' abilities and grow their agency, ultimately leading to the fulfillment of competencies (Cleary & Zimmerman, 2004; Cordova & Lepper, 1996; Deci & Moller, 2005; Lawrence-Brown, 2004; The Learning Accelerator, 2015; Tomlinson & Strickland, 2005; Santamaria, 2009; Valiandes et al., 2011). There is also significant evidence that having students drive their own learning (e.g., setting goals, creating and managing plans, reflecting on progress, etc.) facilitates student engagement, motivation, and agency, as well as promtes a path to cognitively demanding experiences (Mohammed, 2016; The Learning Accelerator, 2015; Pane et al., 2015; Tomlinson & Strickland, 2005). In more recent literature, structures that enable **diverse demonstrations**

of mastery are noted as effective means of customizing the learning experience (Hall, 2002; Hattie, 2009; Pane et al., 2015; Toshalis & Nakkula, 2012; Yonezawa, 2012). Here again, students exercise agency and experience options that cultivate self-efficacy and academic achievement (Flowerday & Schraw, 2000; Katz & Assor, 2007; Mohammed, 2016; The Learning Accelerator, 2015; Pane et al., 2015; Tomlinson & Strickland, 2005; Yonezawa, 2012). Additionally, there is strong support for customization according to modes of learning or how learners access, grapple with, and demonstrate learning (Cleary & Zimmerman, 2004; Tomlinson, 2014).

Theoretical Assumptions Supporting the Role of Customization in Learning

The most established body of literature backing various actions and conditions associated with customization comes from research on differentiated instruction and teaching to mixed-ability classrooms (Lawrence-Brown, 2004; Tomlinson, 2014; Tomlinson & Strickland, 2005; Santamaria, 2009; Valiande et al, 2011). The driving theory behind these models of teaching and learning is an assumption that learners experience learning differently due to their personal characteristics, including but not limited to readiness, prior knowledge, skill level, modalities of learning, intelligence preference, gender, language, and culture (Gardner, 1993; Jonassen & Grabowski, 1993; Tomlinson, 2014). This foundational assumption is followed by the belief that tailored adjustments can be made to the learning experience to make it more meaningful and effective for all (Bloom, 1984; Hall, 2002; Hattie, 2009; Powell & Lines, 2010; Santamaria, 2009; US Department of Education, 2010; Yonezawa, 2012).

Impacts of Customization on Learner Outcomes

Practices of customization have been shown to effectively foster self-regulated, intrinsically-motivated learning and lead to positive academic and non-academic student outcomes (Mohammed, 2016). Practices noted as central to differentiation have been validated by research on effective teaching conducted from the mid-1980's to present—including, for example, effective management procedures, grouping students for instruction, and engaging learners (Ellis & Worthington, 1994). Furthermore, Hattie's extensive meta-analyses conducted over the past decade show especially strong evidence for positive impact on student achievement through customization practices like high expectations, feedback, awareness of stages of cognitive development, and setting challenging, explicit goals. Overall, the full customization "package" lacks empirical validation, and there remains an acknowledged and decided gap in the literature in this area that warrants future research.

Guidelines for Enabling Customization

In the table below, guidelines for effective use and how to create conditions that enable customized learning are detailed. These are presented in depth and aligned with the body of research summarized above. These guidelines are also pulled into the following section, describing the construction of look fors related to customization.

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Appropriate Challenge: Students engage with appropriately challenging activities that meet them at their developmental level (ZPD), stretching them just beyond their comfort zone.	Individuals experience learning differently due to their individual variability, and the content, process, and products of the learning experience can be adjusted continuously to be more effective, engaging, and motivating by responding to individual readiness, prior knowledge, and skill level (Jonassen & Grabowski, 1993; Tomlinson & Stricklans, 2005). Students should experience content and learning tasks that continually respond to their changing developmental levels and levels of mastery. Individuals' unique developmental levels can be targeted to make learning experiences more effective, engaging, and motivating (Cordova & Lepper, 1996). Consciously facilitating access to the content and curriculum for individuals at different developmental levels allows learners to engage and grow their knowledge, skills, and ability.	▶ Self esteem (Tomlinson & Allen, 2000) ▶ Positivety about the subject area under study (Tomlinson & Allen, 2000) ▶ Academic achievement (Hattie, 2003) ▶ Learning and content mastery for students who start with varying degrees of proficiency (Hanover Research, 2012; Tomlinson & Allen, 2000; Santamaría, Fletcher, & Bos, 2002)	**Engage upper ZPD limits:** ▶ Instruction and content should meet students at the upper limits of their zone of proximal development (ZPD) (Hall, 2009; Tomlinson & Strickland, 2005; Vygotsky, 1978). ▶ Individual academic support can be offered to ensure learners are experiencing developmentally-appropriate content (Pane et al., 2015). **Set challenging goals:** ▶ Educators should set high expectations and ensure an increasing level of challenge (Hattie, 2003 & 2009). **Create feedback loops:** ▶ Individualized feedback and transparent data points should be continuously shared with students and used to plan instruction, check-ins, goal setting, and progression through personalized sequences of learning (Cleary & Zimmerman, 2004; Lawrence-Brown, 2004; Valiande et al., 2011). **Use data to support customization:** ▶ Educators should use data to understand student progress and make instructional decisions (Pane et al., 2015). **Scaffold instruction to engage students at their current level:** ▶ Educators should use modeling, guided practice, and eventually independent practice to facilitate mastery (The Learning Accelerator, 2015). ▶ Consider daily whole class instruction to address common needs (The Learning Accelerator, 2015).

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Student Driven: Students deliberately self-assess, set goals, create plans to meet those goals, and progress along their learning pathway in ways that allow them to be appropriately challenged and meet their objectives.	Students are motivated by having autonomy or agency over their learning. As a result, they should be supported to make choices about and drive their own learning process in ways that support increased self-efficacy and the relevance of learning (Dickinson, 1995; Deci & Ryan, 1985). Students advance through learning according to their readiness and preferred modes of learning. They should be encouraged to pursue learning opportunities in the order that works best for them, and spend as much or as little time with learning opportunities as needed to master concepts or competencies (Hattie, 2003; Pane et al., 2015).	▶ Motivation (Schunk, 1996; Wood, Bandura, & Bailey, 1990) ▶ Academic achievement (Schunk, 1996; Wood, Bandura, & Bailey, 1990) ▶ Self efficacy (Cordova & Lepper, 1996)	**Enable varied pacing and sequencing:** ▶ The pacing of learning should be unique to individuals' needs, and students should be required to show that they understand a topic before they can move on to a new topic (Pane et al., 2015). ▶ The pacing and order of learning should align with individuals' preferred modality of learning (Mohammed, 2016; The Learning Accelerator, 2015; Pane et al., 2015; Tomlinson & Strickland, 2005). ▶ Different students should have opportunitites to work on different topics or skills at the same time (Pane et al., 2015). ▶ Students should have opportunities to review or practice new material until they fully understand it (Hattie, 2003; Pane et al., 2015). **Create well designed opportunities for mangeable choice:** ▶ Choices should be meaningful and relevant; they should reflect a student's personal goals, interests, and values (Flowerday & Schraw, 2000; Katz & Assor, 2007). ▶ Choices should be competence-enhancing; they should reflect a student's developmental level so the student feels that they are capable of demonstrating competence (Pintrich & Schunk, 2002). ▶ Choices should be provided in moderation; they should be limited to a manageable number to prevent students from feeling "choice overload" and students should get sufficient time to make choices (Iyengar & Lepper, 2000). **Promote self-regulation:** ▶ Processes of goal setting and planning enable students to engage self-control, self-observation, and ultimately self-evaluation, and as a result to judge how well they perform by systematically comparing one's performance with specific mastery criteria (Cleary & Zimmerman, 2004).

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Additional Supports for Students with IEPs or Defined Language Needs: Students engage in learning activities tailored to their unique profiles of defined learning needs and preferences.	Each student has a unique learning profile, as a result it is crtical to have information on how they learn best, as well as how they are unique in other ways (Jonassen & Grabowski, 1993; Santamaria, 2009; Tomlinson & Strickland, 2005). Customized and dynamic opportunities to access learning help reach students where they are. Students are able to engage in a collective learning experience that includes multiple points of entry for individuals with varied modes of learning (Hall, 2002; Tomlinson & Strickland, 2005).	▶ Academic achievement (Mohammed; The Learning Accelerator, 2015; Pane et al., 2015) ▶ Engagement (Mohammed; The Learning Accelerator, 2015; Hattie, 2003) ▶ Intrinsic motivation and self-regulation (Cleary & Zimmerman, 2004; Deci; Cordova; The Learning Accelerator, 2015)	**Provide additional supports:** ▶ Instruction should be differentiated in order to reach students with varied learning styles and profiles (Tomlinson & Strickland, 2005; Gardner, 1993; Santamaria, 2009). ▶ Materials, content, and curriculum should be individualized to meet students' unique modalities of learning (Tomlinson & Strickland, 2005). ▶ Competency-based progression should be used and the pacing of learning should align with individuals' preferred modality of learning (Mohammed, 2016; The Learning Accelerator, 2015; Pane et al., 2015; Tomlinson & Strickland, 2005).

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Demonstrations of Learning: Students demonstrate their evolving knowledge, skills, and habits through a variety of modes and at various points in the learning process.	Providing students with thoughtfully designed ways to demonstrate their understanding ensures opportunities to engage in self-direction and builds agency, sense of motivation, and level of engagement with learning (Deci & Ryan, 1985).	▶ Motivation (Cordova & Lepper, 1996) ▶ Self-efficacy (Deci & Ryan, 1985) ▶ Academic achievement (Deci & Ryan, 1985)	**Ensure options for demonstration of mastery** ▶ A range of options for demonstration of mastery should be available and specific to students' needs; assessment may take multiple forms (e.g., quiz, test, project, presentation) (Mohammed, 2016; The Learning Accelerator, 2015; Pane et al., 2015; Tomlinson & Strickland, 2005). ▶ Students should be aware of their own learning goals and track progress toward mastery (Pane et al., 2015). ▶ A system should be in place that supports a student's ability to advance when they demonstrate mastery, rather than at the end of the school year (Pane et al., 2015). ▶ "On demand" assessment should be possible so that students can demonstrate mastery when ready (rather than at the same time as the rest of the class) and then pursue new learning immediately (Pane et al., 2015; Yonezawa, 2012). **Use formative assessment** ▶ Formative assessments and resulting data should be used to tailor instruction, materials, content, and curriculum (Pane et al., 2015; Mohammed, 2016; The Learning Accelerator, 2015).

Customization RESEARCH SUMMARY

REFERENCES

Bloom, B.S. (1984). The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring. *Educational Researcher, 13*(6), 4-16.

Cleary, T.J. and Zimmerman, B.J. (2004). Self-regulation empowerment program: A school-based program to enhance self-regulated and self-motivated cycles of student learning. *Psychology in the School, 41*(5): 537-550.

Cordova, D. I., & Lepper, M. R. (1996). Intrinsic motivation and the process of learning: Beneficial effects of contextualization, personalization, and choice. *Journal of Educational Psychology, 88*(4), 715-730.

Deci, E. L., & Moller, A. C. (2005). The concept of competence: A starting place for understanding intrinsic motivation and self-determined extrinsic motivation. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 579-597). New York, NY, US: Guilford Publications.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self determination in human behavior.* New York, NY: Plenum Press.

Dutke, S., Grefe, A.C., and Leopold, C. (2015). Learning from scientific texts: personalizing the text increases transfer performance and task involvement. *European Journal of Psychology of Education, 31*(4): 499-513.

Elliot & C. J. Dweck (Eds.), Handbook of competence and motivation, (pp. 579-597). New York: Guilford Press.

Flowerday, T., & Schraw, G. (2000). Teachers' beliefs about instructional choice: A phenomenological study. *Journal of Educational Psychology, 92*: 634-645.

Gardner, H. (1993). *Frames of mind: The theory of multiple intelligences.* New York, NY: BasicBooks.

Hall, T. (2002). Differentiated instruction: Effective classroom practices report. Washington, D.C.: National Center on Accessing the General Curriculum, CAST, U.S. Office of Special Education Programs.

Hall, T. (2009). Differentiated Instruction and Implications for UDL Implementation. Retrieved from http://aim.cast.org/learn/historyarchive/backgroundpapers/differentiated_instruction#.UxWjEvm.

SySo Hanover Research. (2012). *Best Practices in Personalized Learning Environments* (Grades 4-9). Charlottesville, VA: Hanover Research.

Hattie, J. (2003). Teachers make a difference: what is the research evidence? Paper presented at the annual meeting of Australian Council for Educational Research, Melbourne, Australia.

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement.* London: Routledge.

Hunt, L. & Yoshida-Ehrmann, E. (2016). Linking Schools of Thought to Schools of Practice. *Gifted Child Today, 39*(3), 164-172.

Iyengar, S., & Lepper, R. (2000). When choice is demotivating: Can one desire too much of a good thing? *Journal of Personality and Social Psychology, 79*: 995-1006.

Jonassen, D. H. & Grabowski, B. L. (1993). *Handbook of individual differences, learning, and instruction.* Hillsdale: Lawrence Erlbaum.

Katz, I., & Assor, A. (2007). When choice motivates and when it does not. *Educational Psychology Review, 19*, 429-442.

Lawrence-Brown, D. (2004). Differentiated instruction: Inclusive strategies for standards-based learning that benefit the whole class. *American Secondary Education, 32*(3), 34-63.

Mohammed, S. (2016). *Personalized learning: Trendy and true.* Washington, DC: The Brookings Institute. Retrieved from https://www.brookings.edu/blog/brown-center-chalkboard/2016/06/08/personalized-learning-trendy-and-true/.

Marzano, R. J., Pickering, D., & Pollock, J. E. (2001). *Classroom instruction that works: Research based strategies for increasing student achievement.* Alexandria, VA: Association for Supervision and Curriculum Development.

Pane, J.F., Steiner, E.D., Baird, M.D., and Hamilton, L.S. (2015). *Continued progress: Promising evidence on personalized learning.* Santa Monica, CA: RAND Corporation. Retrieved from https://www.rand.org/pubs/research_reports/RR1365.html.

Pintrich, P. R., & Schunk, D. H. (2002). *Motivation in education theory, research, and applications* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.

Powell, J. D., & Lines, J. I. (2010). Make learning personal: Recommendations for classroom practice. *About Campus, 15*(2), 20-25. doi:10.1002/abc.20018.

Santamaría, L. J., Fletcher, T. V., & Bos, C. S. (2002). Effective pedagogy for English language learners in inclusive classrooms. In A. Ortiz & A. Artiles (Eds.), *English language learners with special education needs* (pp. 133–157). Washington, DC: Center for Applied Linguistics (CAL).

Santamaria, L.J. (2009). Culturally responsive differentiated instruction: Narrowing gaps between best pedagogical practices benefiting all learners. *Teachers College Record, 111*(1), 214-247.

Seel, N. (2012). *Encyclopedia of the sciences of learning* (1st ed.). New York: Springer.

The Learning Accelerator. (2015). *Blended learning research clearinghouse 1.0*. Retrieved from http://learningaccelerator.

org/media/12132951/BL%20Research%20Clearinghouse%20
1.0-050715%20(1).pdf.

Tomlinson, C. A., & Allan, S. D., (2000). *Leadership for differentiating schools and classrooms*. Alexandria, VA: ASCD.

Tomlinson, C. A. (2014). *Differentiated classroom*. Alexandria: ASCD. Retrieved from http://ebookcentral. proquest.com.proxy.library.vanderbilt.edu/lib/Vand/detail. action?docID=1709534.

Tomlinson, C. A., & Strickland, C. A. (2005). *Differentiation in practice: A resource guide for differentiating curriculum, grades 9-12*. Alexandria, VA: Assoc. for Supervision and Curriculum Development.

Toshalis, E. and Nakkula, M.J. (2012). Motivation, engagement, and student voices. *The Students at the Center Series: Teaching and Learning in the Era of the Common Core*. Boston, MA: Jobs for the Future.

U.S. Department of Education Office of Educational Technology. (2010). *Transforming American education learning powered by technology: National education technology plan 2010*. Washington, DC: U.S. Department of Education. Retrieved from http://www.ed.gov/sites/default/ files/netp2010.pdf.

Valiande, S., Koutselini, M., & Kyriakides, L. (2011). Investigating the impact of differentiated instruction in mixed ability classrooms: Its impact on the quality and equity dimensions of education effectiveness. Paper published in the proceedings of the International Congress for School Effectiveness and Improvement 2011.

Vygotsky, L.S. (1978). *Mind in society: The development of higher psychological processes*. Massachusetts: Harvard University Press.

Yonezawa, S., McClure, L. & Jones, M. (2012). Personalization and student-centered learning. *The Students at the Center Series: Teaching and Learning in the Era of the Common Core*. Boston, MA: Jobs for the Future.

Purposefulness

RESEARCH SUMMARY

Students work with effort and energy to accomplish short- and long-term goals that connect to a meaningful purpose and are aware of their progress toward achieving these goals at all times.

Purposefulness brings a number of interrelated concepts together into a single Principle that captures the importance of students working with effort and energy toward clear, meaningful, and appropriate goals and being aware, at all times, of their progress toward achieving these goals. Unlike some of the other Principles in the C2D2 Student Look Fors Framework, such as Collaboration or Rigor, Purposefulness is not extensively researched as a single construct or concept but instead appears in research as a number of independent but interrelated concepts including goals and goal setting (Locke, 1968), feedback (Kluger & DeNisi, 1996; Hattie & Timperlay, 2007), metacognitive strategies (Lavery, 2008), self-regulation and self-efficacy (Bandura, 1991), growth mindset (Dweck, 2000), flow (Csikszentmihalyi, 2008), urgency (Kotter, 2008) and academic press (McDill, Natriello & Pallas, 1986). These concepts were synthesized into four sub-elements that together make up Purposefulness.

▶ **Goal Orientation:** Students work toward meaningful short- and long-term goals and can articulate why they are prioritizing these goals, how short-term goals (e.g. success on daily work) build toward long-term goals, and what success looks like at each stage.

▶ **Awareness of Progress:** Students are aware of their current progress toward goals by way of self-assessment and frequent peer and educator feedback.

▶ **Growth Mindset:** Students engage and persevere at points of difficulty or error; they avoid self-limiting statements and instead utilize growth mindset language and positive self-talk.

▶ **Academic Urgency:** Students use their time and energy strategically and employ self-regulation strategies (e.g. breaks, fidgets, movement, self-talk) as needed to maximize learning and progress toward goals.

The importance of Purposefulness to student learning is supported by various learning theories and connected empirical evidence. Self-determination theory suggests that students must experience feelings of competence, autonomy, and relatedness to engage with learning (Appleton, Christenson, & Furlong, 2008). Purposefulness supports a student's sense of competence by ensuring students know what is expected of them (Defined Dreams & Goals), understand how to get there from where they currently are (Awareness of Progress), and believe they are in control of achieving their goals through hard work and self-regulation (Growth Mindset and Academic Urgency). Cognitive theories also support the notion of using goals and feedback as forms of scaffolding (Vygotsky, 1977) and social-learning theory suggests that clear goals and feedback promote a student's feelings of self-efficacy and that self-efficacy in turn increases motivation and effort leading to improved academic performance (Zimmerman & Bandura, 1992). The theoretical assumptions underpinning the importance of Purposefulness as a principle of impactful learning have been validated by a number of empirical studies. This research highlights that goal setting and achieving goals, feedback, growth mindset, and self-regulation, all parts of Purposefulness, are positively related to outcomes such as motivation and persistence, elements of self-concept, and academic performance (See Table 1). However, segments of the research base supporting Purposefulness also highlight the importance of employing the strategies with care. Feedback for example, is associated with a variety of positive student outcomes, yet a number of studies also report negative association (Hattie & Timperlay, 2007). This variability results from the wide range in types of feedback and delivery methods that this particular research focuses on. Further information on the guidelines for effective use related to each principle are outlined in the table below.

TABLE: RESEARCH-BASED ELEMENTS OF PURPOSEFULNESS

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Goal Orientation: Students work toward meaningful short- and long-term goals and can articulate why they are prioritizing these goals, how short-term goals (e.g. success on daily work) build toward long-term goals, and what success looks like at each stage.	Goal-setting theory hypotheses that: ▸ goals direct attention and action and can increase motivation and effort as long as the goal is meaningful, appropriately challenging, and the individual is continually aware of their progress toward their goal; ▸ accomplishing the goals can lead to satisfaction and further motivation; and ▸ not accomplishing the goals will lead to frustration and lower motivation (Locke, 1968). This theory is rooted in humanist and motivational learn theories such as self-determination theory (Deci & Ryan, 2000) and the theory of flow (Csikszentmihalyi, 2008), which both discuss the inherent need students have for feeling competence and success and the motivation that stems from that.	▸ Motivation (Locke & Latham, 2002; Locke & Brian, 1966; Brian & Locke, 1967) ▸ Responsibility and ownership of learning (Fryer & Elliot, 2008) ▸ Persistence, creativity and risk-taking in their achievement of goals (Dewett, 2007; Lepper et al., 1973; Moeller et al., 2012) ▸ Achievement (Latham & Locke, 2007; Locke & Latham, 1990; Hattie 2009) ▸ Self-regulation (Schunk, 1991) ▸ Self-efficacy (Hattie, 2009)	**Ensure learners have personally meaningful goals for themselves:** ▸ Effect of goal setting on achievement depends on investment in the goal (Klinger, 1977). ▸ People are more likely to maintain and ask for feedback on goals that are meaningful (Cialdini, 2009; Locke & Latham, 1990). ▸ Individuals suppress distractions when they are engaged in the pursuit of their goals (Shah et al, 2002; Emmon & Diener, 1986). **Ensure goals are appropriately challenging and not overly complex as to be unattainable in the time frame:** ▸ Appropriately challenging goals give people a sense of competence (Deci & Ryan, 2000; Deci & Ryan, 1985). ▸ Challenging goals increase self-efficacy, skill acquisition, and motivation (Schunk, 1990; Vancouver & Kendall, 2006; Sitzman & Ely, 2011). **Ensure students have clear, specific goals:** ▸ Research shows both procedural and outcome-focused goals help but suggests starting with procedural goals and then moving to outcome goals to support deeper learning (Schunk & Rice, 1991; Zimmerman & Kitsantas, 1999). ▸ Research shows both short (Bandura & Schunk, 1981; Schunk, 1990) and long-term goals can be motivating (Rader, 2005), but suggests providing early success opportunities through short-term goals that build toward long-term goals (Ambrose, et al. 2010; Bandura & National Institute of Mental Health, 1986). **Support goal setting and goal directedness:** ▸ Provide direct instruction on goal setting ▸ Model goal setting (Kanfer, 1985; Stiggins & Chappuis, 2008). ▸ Support students in self-assessment before setting goals to ensure they are not too easy or too hard. ▸ Set upper and lower limits for goals (Schunk, 1985).

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Awareness of Progress: Students are aware of their current progress toward goals by way of self-assessment and frequent peer and educator feedback.	Social learning theory supports the use of feedback as a strategy to increase self-efficacy. ▶ Feedback reduces discrepancies between current and desired understanding or performance (Hattie & Timperlay, 2007). Self-determination theory suggests feedback can support feelings of competence and in turn, creates greater motivation and engagement with learning activities. Student's own self-evaluations and self-reflections are also part of increasing self-awareness. Meta cognitivism is a learning theory which purports that educators can assist students in taking responsibility for their own learning by developing self-regulation skills such as planning and self-monitoring. ▶ Feedback is a cyclical, continuous process (Thurlings et al., 2012). ▶ Feedback helps students identify gaps in actual and desired outcomes (Sadler, 1989; Nicol & McFarlane-Dick, 2006).	▶ Deeper learning (Balzer et al, 1989 ▶ Persistence (Deci et al., 1999) ▶ Learning and academic achievement (Hattie & Timperly, 2007; Crooks, 1988; Kluger & DeNisi, 1996; Natriello, 1987) ▶ Early discovery of errors or misconceptions (Topping, 2005; Topping & Ehly, 1998; Hallahan et al., 1982) ▶ On-task behavior (Topping, 2005; Topping & Ehly, 1998; Hallahan, Lloyd, Kneedler, & Marshall, 1982; Rooney et al., 1984)	**Be aware of differences between various types of feedback:** ▶ Feedback on a task or product; ▶ Feedback on a process (may address cognitive skills or how a student does something); ▶ Feedback on students own metacognitive process (e.g. self-reflection); and ▶ Feedback on the student generally. **Provide impactful forms of feedback:** ▶ Fill in the gap between what is understood and what is aimed to be understood through feedback; provide feedback directly related to goals (Hattie & Timperlay, 2007; Sadler, 1989). ▶ Address specific misinterpretations immediately and where there is a complete lack of understanding, provide additional instruction instead of simply more feedback (Hattie & Timperlay, 2007). ▶ Focus feedback on how to do the task more effectively (Hattie & Timperlay, 2007). ▶ Avoid feedback that is primarily praise, rewards, and punishment (Hattie & Timperlay, 2007). ▶ Consider using video, audio, or computer-assisted feedback. ▶ Provide opportunities to revise and improve the task or performance (Andrade & Valtcheva, 2009). **Foster peer assessment:** ▶ Plan and implement opportunities for peer feedback (Topping, 2005; Topping & Ehly, 1998). ▶ Help students understand how to give helpful feedback through instruction and examples. ▶ Provide students with assessment criteria, guidelines, and checklists to guide feedback. ▶ Monitor, assist, and provide feedback throughout the process (Topping, 2009).

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
			Foster opportunities for self-assessment ▸ Ensure opportunities for students to provide themselves with feedback via self-reflection (Andrade & Boulay, 2003; Andrade, Du & Wang, 2008; Ross, Rolheiser, & Hogaboam-Gray, 1999). ▸ Help students understand the value of self-assessment. ▸ Create clear criteria on which to base assessment. ▸ Indify a specific task or performance to assess. ▸ Model self-assessment. ▸ Provide direct instruction in and assistance with self-assessment. ▸ Cue students when it is appropriate to self-assess.

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Growth Mindset: Students engage and persevere at points of difficulty or error; they avoid self-limiting statements and instead utilize growth mindset language and positive self-talk.	The self-theory of motivation posits that those with a growth mindset are more motivated to learn and are resilient in the face of challenges. ▸ Those with a growth mindset attribute success to learning and effort, they are not afraid of failure, and are more responsive to process feedback (Dweck, 2000). Growth mindset creates greater receptivity to goals and feedback. Neuroplasticity is a widely accepted doctrine of neuroscience which supports the notion that the brain is continuously plastic and can alter according to environment. ▸ Countless studies suggest that cortical thickness and volume grow as a result of environmental richness (Diamond et al., 1964; Bennett et al., 1962).	▸ Improved academic performance (Claro & Paunesku, 2014; Aronson, 2002). ▸ Increased enjoyment and appreciation of education (Aronson et al., 2002). ▸ Inccreased motivation (Dweck, 2007). ▸ Greater attention paid to the process of learning versus the outcomes of learning (Mangels et al., 2006). It is important to note that this relationship is mediated by learning goals, effort attribution and positive strategies. This may suggest that other factors work in conjunction with growth mindset to influence academic success (Blackwell et al., 2007).	**Support small wins:** ▸ Create situations in which learners can experience small, quick successes. **Focus feedback on effort:** ▸ In order to foster a growth mindset, educators should focus feedback on a student's efforts to practice, or examples of prior practice that have led to success. **Set goals that are personal versus competing with others:** ▸ Since one of the primary factors underlying the adoption of a fixed mindset appears to be social comparison, educators may wish to support goal setting which leads to personal progress relative to self (Ommundsen, 2001). **Accompany development of a growth mindset with instruction on skill-building:** ▸ Where strong growth mindset exists, students may feel constrained by their skills/ general ability to put their effort to use. Therefore, educators must also equip students with the skills and strategies necessary for academic success (Braten & Olaussen, 1998).

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Academic Urgency: Students use their time and energy strategically and employ self-regulation strategies (e.g. breaks, fidgets, movement, self-talk) as needed to maximize learning and progress toward goals.	The sub-element of Academic Urgency builds upon research related to academic press (McDill et al., 1986), self-regulation (Corno, 1986; Bandura, 1991), volition control (Kuhl & Beckmann, 1985), and urgency (Kotter, 2008). The hypothesis connecting Academic Urgency and improved learning is that students who can "protect their intentions to learn in school from competing goals or interests" (Corno, 1986) and can remain focused through self-regulatory strategies, will be able to engage with learning activities and master content and skills.	▸ Improved academic performance (Lavery, 2008; Dignath et al., 2008). ▸ Use of metacognitive and cognitive strategies and more effective effort management (e.g., Ames & Archer, 1988; Dweck & Elliott, 1983; Eccles, 1983; Meece et al., 1988; Nolen, 1988; Paris & Oka, 1986).	**Foster student self-regulation:** ▸ Educators should teach self-regulatory strategies. ▸ Educators and other adults should model self-regulation. ▸ Students should receive cues for when self-regulation is necessary. **Develop "a sense of urgency":** ▸ Model that "every minute matters" by using all available time to learning activities, even if it's just a few "spare" minutes at the end of a lesson (Lemov, 2010). ▸ Operate at a sufficient enough pace to demonstrate learning is a priority, keep students' attention, and not waste time (Lemov, 2010). ▸ Have routines and procedures in place to make sure time is not wasted.

Purposefulness RESEARCH SUMMARY

REFERENCES

Allen, M., Witt, P.L. & Wheeless, L.R. (2006). The role of teacher immediacy as a motivational factor in student learning: Using meta-analysis to test a causal model. *Communication Education, 55*(1), 21-31.

Ambrose, et al. (2010). *How learning works: Seven research-based principles for smart teaching.* San Francisco, CA: Jossey-Bass

Ames, C. & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology, 80*(3), 260-267.

Andrade, H. G., & Boulay, B. A. (2003). Role of rubric-referenced self-assessment in learning to write. *The Journal of Educational Research, 97*(1), 21-34.

Andrade, H. L., Du, Y., & Wang, X. (2008). Putting rubrics to the test: The effect of a model, criteria generation, and rubric-referenced self-assessment on elementary school students' writing. *Educational Measurement: Issues and Practice, 27*(2), 3-13.

Andrade, H. & Valtcheva, A. (2009). Promoting learning and achievement through self-assessment. *Theory Into Practice, 48*(1), 12-19.

Appleton, J.J., Christenson, S.L., & Furlong, M.J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in Schools, 45*(5).

Aronson, J., Fried, C. B., & Good, C. (2002). Reducing the effects of stereotype threat on African American college students by shaping theories of intelligence. *Journal of Experimental Social Psychology, 38*(2), 113-125.

Balzer, W. K., Doherty, M. E., & O'Connor, R., Jr. (1989). Effects of cognitive feedback on performance. *Psychological Bulletin, 106*(3), 410-433.

Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology, 41*(3), 586-598.

Bandura, A., & National Inst of Mental Health. (1986). Prentice-Hall series in social learning theory. S*ocial foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ, US: Prentice-Hall, Inc.

Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes, 50*(2), 151-411.

Bennett, E.L., Rosenzweig, M.R., & Diamond, M.C. (1962). *Rat brain: Effects of environmental enrichment on wet and dry weights science, 163*(3869), 825-826.

Blackwell, L.S., Trzesniewski, K.H. & Dweck, C.S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development, 78*(1), 246-263.

Braten, I. & Olaussen, B.S. (1998). The relationship between motivational beliefs and learning strategy use among Norwegian college students. *Contemporary Educational Psychology, 23*(2), 182-194.

Bryan, J. F., & Locke, E. A. (1967). Goal setting as a means of increasing motivation. *Journal of Applied Psychology, 51*(3), 274-277.

Cialdini, R.B. (2009). *Influence: Science and practice*. Boston, MA: Allyn and Bacon.

Claro, S. & Paunesku, D. (2014). Mindset gap among SES groups: The case of Chile with census data. *Society for Research on Educational Effectiveness.* Retrieved from https://eric.ed.gov/?id=ED562769

Corno, L. (1986). The metacognitive control components of self-regulated learning. *Contemporary Educational Psychology, 11*, 333-346.

Crooks, T.J. (1988). The impact of classroom evaluation practices on students. *Review of Educational Research, 58*(4), 438-481.

Csikszentmihalyi, M. (2008). *Flow: The psychology of optimal experience.* New York, NY: HarperCollins Publishers.

Deci, E.L., Koestner, R. & Ryan, R.M. (1999). A meta-analytic review of experiments examining the effect of extrinsic rewards on intrinsic motivation. *Psychology Bulletin. 125*(6), 627-668.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum.

Deci, E. L., & Ryan, R. M. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68-78.

Dewett, T. (2007). Linking intrinsic motivation, risk taking, and employee creativity in an R&D environment. *R&D Management, 37*(3).

Diamond, M.C., Krech, D. and Rosenzweig, M.R. (1964). The effects of an enriched environment on the histology of the rat cerebral cortex. *J. Camp. Neural., 123*(11), 1-120.

Dignath, C. Buettner, G. & Langfeldt, H. (2008). How can primary school students learn self-regulated learning strategies most effectively? A meta-analysis on self-regulation training programs. *Educational Research Review, 3*(2), 101-129.

Dweck, C. (2000). *Self-theories: Their role in motivation, personality, and development*. New York, NY: Routledge.

Dweck, C. (2007). *Mindset: The new psychology of success*. New York: Penguin Random House.

Dweck, C. S., & Elliott, E. S. (1983). Achievement motivation. In P. H. Mussen (Gen. Ed.), & E. M. Hetherington (Ed.), *Handbook of child psychology* (Vol. 4, pp. 643-691). New York, NY: Wiley.

Earley, P. C., Northcraft, G. B., Lee, C., & Lituchy, T. R. (1990). Impact of process and outcome feedback on the relation of goal setting to task performance. *Academy of Management Journal, 33*(1), 87-105.

Eccles, J. (1983). Expectancies, values and academic behaviors. In J. T. Spence (Ed.), *Achievement and achievement motives: Psychological and sociological approaches* (pp. 75-146). San Francisco, CA: Freeman.

Fryer, J. W., & Elliot, A. J. (2008). Self-regulation of achievement goal pursuit. In D.H. Schunk & B.J. Zimmerman (Eds.) *Motivation and self-regulated learning: Theory, research,*

and applications (pp. 53-75). New York: Routledge..

Emmons, R. A. (1986). Personal strivings: An approach to personality and subjective well-being. *Journal of Personality and Social Psychology, 51*(5), 1058-1068.

Emmons, R. A., & Diener, E. (1986). Influence of impulsivity and sociability on subjective well-being. *Journal of Personality and Social Psychology, 50*(6), 1211-1215.

Hallahan, D. P., Lloyd, J. W., Kneedler, R. D., & Marshall, K. J. (1982). A comparison of the effects of self- versus teacher-assessment of on-task behavior. Behavior Therapy, 13(5), 715-723.

Hattie, J. & Timperlay, H. (2007). The power of feedback. *Review of Educational Research. 77*(1), 81-112.

Hattie, J. (2009). *Visible learning for teachers: Maximizing impact on learning*. New York, NY: Routledge.

Kanfer, R. & Hulin, C.L. (1985). Individual differences in successful job searches following lay-off. *Personnel Psychology, 38*(4).

Klinger, E. (1977). *Meaning and void: Inner experience and the incentives in people's lives*. Minneapolis, MN: University of Minnesota Press.

Kluger, A. N., & DeNisi, A. (1996). The effects of feedback interventions on performance: A historical review, a meta-analysis, and a preliminary feedback intervention theory. *Psychological Bulletin, 119*(2), 254-284.

Kotter, J.P. (2008). *A sense of urgency*. Boston, MA: Harvard Business School Publishing.

Kuhl, J., & Beckmann, J. (1985). *Action control: From cognition to behavior*. New York: Springer.

Latham, G.P. & Locke, E.A. (2007). New developments in and directions for goal-setting research. *European Psychologist, 12*(4), 290-300.

Lavery, L. (2008). Self-regulated learning for academic success: An evaluation of instructional techniques. PhD thesis, University of Auckland, New Zealand.

Lemov, D. (2010). *Teach like a champion: 49 techniques that put students on the path to college*. San Francisco, CA: John Wiley & Sons.

Lepper, M. R., Greene, D., & Nisbett, R. E. (1973). Undermining children's intrinsic interest with extrinsic reward: A test of the "overjustification" hypothesis. J*ournal of Personality and Social Psychology, 28*(1), 129-137.

Locke, E. A. (1968). Toward a theory of task motivation and incentives. *Organizational Behavior & Human Performance, 3*(2), 157-189.

Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting & task performance*. Englewood Cliffs, NJ, US: Prentice-Hall, Inc.

Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist, 57*(9), 705-717.

Locke, E.A. & Bryan, J.F. (1966). The effects of goal-setting, rule-learning, and knowledge of score on performance. *The American Journal of Psychology, 79*(3), 451-457.

Mangels et al., (2006). Why do beliefs about intelligence influence learning? A social cognitive neuroscience model. *Social Cognitive and Affective Neuroscience, 1*(2), 75-86.

McDill, E. L., Natriello, G., & Pallas, A. M. (1986). A population at risk: Potential consequences of tougher school standards for student dropouts. *American Journal of Education, 94*(2), 135-181.

Meece, J. L., Blumenfeld, P. C., & Hoyle, R. H. (1988). Students' goal orientations and cognitive engagement in classroom activities. *Journal of Educational Psychology, 80*(4), 514-523.

Moeller, A., Theiler, J.M. & Wu, C. (2012). Goal setting and student achievement: A longitudinal study. *Modern Language Journal, 96*(2), 153-169.

Natriello, G. (1987). The impact of evaluation processes on students. *Educational Psychologists, 22*(2), 155-175.

Nicol, D.J. & McFarlane-Dick, D. (2006). Formative assessment and self-regulated learning: A model and seven principles of good feedback practice. *Studies in Higher Education, 31*(2), 199-218.

Nolen, S. B. (1988). Reasons for studying: Motivational orientations and study strategies. *Cognition and Instruction, 5*(4), 269-287.

Ommundsen, Y. (2001). Self-handicapping strategies in physical education classes: The influence of implicit theories of the nature of ability and achievement goal orientations. *Psychology of Sport and Exercise, 2*(3), 139-156.

Paris, S. G., & Oka, E. R. (1986). Self-regulated learning among exceptional children. *Exceptional Children, 53*(2), 103-108.

Paul, B. & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice, 5*(1), 7-74.

Rader, L.A. (2005). Goal setting for students and teachers six steps to success. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 78*(3), 123-126.

Rooney, K. J., Hallahan, D. P., & Lloyd, J. W. (1984). Self-recording of attention by learning disabled students in the regular classroom. Journal of Learning Disabilities, 17(6), 360-364.

Ross, J.A., Rolheiser, C. & Hogaboam-Gray, A. (1999). *Assessment in the cooperative classroom: Using an action research enhanced version of the train the trainer in-service model to impact teacher attitudes and practices*. American Educational Research Center.

Ryan, R.M. & Deci, E.L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68-78.

Sadler, D.R. (1989). Formative assessment and the design of instructional systems. Instructional Science, 18(2),119-44

Schunk, D. H. (1985). Self-efficacy and classroom learning. *Psychology in the Schools, 22*(2), 208-223.

Schunk, D. H. (1990). Goal setting and self-efficacy during self-regulated learning. *Educational Psychologist, 25*(1), 71-86.

Schunk, D. H. (1991). Self-efficacy and academic motivation, *Educational Psychologist, 26*(3-4), 207-231.

Schunk, D. H. (2003). Self-efficacy for reading and writing: Influence of modeling, goal setting, and self evaluation. *Reading and Writing Quarterly, 19*(2), 159-172.

Schunk, D.H. & Rice, J.M. (1991). Learning goals and progress feedback during reading comprehension instruction. *Journal of Literacy Research, 23*(3), 351-364.

Shah, J.Y., Friedman, R., & Kruglanski, A.W. (2002). Forgetting all else: On the antecedents and consequences of goal shielding. Journal of Personality and Social Psychology 83(6), 1261-1280.

Sitzman,T. & Ely, K. (2011). A meta-analysis of self-regulated learning in work-related training and educational attainment: What we know and where we need to go. *Psychology Bulletin, 137*(3): 421-442.

Smith, K. G., Locke, E. A., & Barry, D. (1990). Goal setting, planning, and organizational performance: An experimental simulation. *Organizational Behavior and Human Decision Processes, 46*(1), 118-134.

Stiggins, R. & Chappuis, J. (2008). *An introduction to student-involved assessment for learning*. New York, NY: Pearson.

Thurling, M., Vermeulen, M., & Stinjen, S. (2012). Understanding feedback: A learning theory perspective. *Educational Research Review, 9*(1), 1-15.

Topping, K. & Ehly, S. (1998). Peer assessment between students in colleges and universities, *Review of Educational Research, 68*(3), 249-276.

Topping, K. (2005). Trends in peer learning. *Educational Psychology, 25*(6), 631–645.

Topping, K.J. (2009). Peer assessment. *Theory into Practice, 48*(1), 20-27.

Vancouver, J.B. & Kendall, N.L. (2006). When self-efficacy negatively relates to motivation and performance in a learning context. *Journal of Applied Psychology, 91*(5), 146-153.

Vygotsky, L.S. (1977). The development of higher psychological functions. *Soviet Psychology, 15*(3),60-73.

Zimmerman, B. (1986). Becoming a self-regulated learner: Which are the key subprocesses? *Contemporary Educational Psychology, 11*(4), 307-313.

Zimmerman, B.J., Bandura, A. & Martinez-Pons, Manuel. (1992). Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal setting. *American Educational Research Journal, 29*(3), 663-676.

Zimmerman, B. J., & Kitsantas, A. (1999). Acquiring writing revision skill: Shifting from process to outcome self-regulatory goals. *Journal of Educational Psychology, 91*(2), 241-250.

Relevance

RESEARCH SUMMARY

The significance that learning tasks and outcomes have to students' interests and goals, prior knowledge, and real-world, culturally-relevant contexts.

Relevance is the significance that content, skills, and habits have to students, interests, goals, prior knowledge, and to real-world, culturally-relevant contexts. Literature discusses a number of ways for educators to create relevance. These include:

▶ **Personal Relevance:** Students work toward meaningful short- and long-term goals and can articulate why they are prioritizing these goals, how short-term goals (e.g. success on daily work) build toward long-term goals, and what success looks like at each stage.

▶ **Academic Relatedness:** Students are aware of the progress they are making toward their goals through self-assessment and frequent peer and educator feedback.

▶ **Real-world Authenticity:** Students engage and persevere at points of difficulty or error; they avoid self-limiting statements and instead utilize growth mindset language and positive self-talk.

▶ **Cultural Relevance:** Students use their time and energy strategically and employ self-regulation strategies (e.g. breaks, fidgets, movement, self-talk) as needed to maximize learning and progress toward goals.

As discussed in more detail in the table below, relevance is associated with improved learner mindsets, behaviors, and learning.

TABLE: RESEARCH-BASED ELEMENTS OF RELEVANCE

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Personal Relevance: Students connect the learning activities and outcomes focused on in the moment to their individual interests or short- and long-term goals.	▶ Students actively participate in learning activities when they are autonomy-supporting (i.e. support students' ability to pursue interests and goals) and participation will lead to personal change and growth (Rogers, 1969; Jonassen, 1999).	▶ Student motivation (Frymier, 1995) ▶ Active participation and student engagement (Cognition and Technology Group at Vanderbilt, 1992)	**Connect learning to relevant problems and student interests** ▶ Learning activities should be "anchored" to a problem or issue to be resolved and that is of interest to the students (Bransford et al., 1990). ▶ Self-reflection among students should be encouraged to deepen understanding of how learning connects to personal interests, goals, and experiences (Yeager et al., 2014).
Academic Relatedness: Students connect the learning activities and objectives focused on in the moment with their existing skills, habits, and knowledge, work completed to date, and future learning.	▶ Learning occurs best through connecting new knowledge to prior knowledge; contextualization of content (integrated curriculum) to promote higher student engagement and transfer of skill (Jonassen, 1999; Stein, 1998; Bransford, 1999).	▶ Transfer of skill (far and high road transfer): divergent findings, even if negative (Perkins & Saloman, 1992; King, 2012) ▶ Conceptual understanding (King, 2012) ▶ Student engagement (King, 2012) ▶ Improvement in problem identification or formulation (Cognition and Technology Group at Vanderbilt, 1992)	**Connect learning to relevant problems and student interests** ▶ Bring tacit processes involved in carrying out higher-order, interdisiplinary thinking into the open, where students can observe, enact, and practice them with help from the teacher (Collins et al., 1989). ▶ Enable multidisciplinary learning environments and integrated assessment through summative and formative assessment and self-reflection (Lave & Wenger, 1991). ▶ Draw realistic connections and enable students to form connections within and between content domains (Anderson et al., 1996).

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Real-world Authenticity: Students connect the learning task and outcomes focused on in the moment with authentic personal, local, and global situations and issues.	▸ Contributes to effective learning through direct experiential confrontation with practical social, ethical, and philosophical problems, etc. (Rogers, 1969). ▸ Enhances students' appreciation of how the subject / field contributes to their lives or the lives of others (King, 2012).	▸ Knowledge transfer—students consolidate relationships between abstract concepts and familiar experiences and/or contexts, and generalize and apply this knowledge (Perkins & Saloman, 1992; King, 2012) ▸ Student engagement (King, 2012) ▸ Positive attitude and interest towards the subject and learning (King, 2012) ▸ Enjoyment of lessons (King, 2012)	**Bring learning into the real world:** ▸ Problem solving can address real-world, complex issues using role-playing exercises, problem-based activities, case studies, etc. (Cognition and Technology Group at Vanderbilt, 1992; Jonassen, 1999).
Cultural Relevance: Students connect the learning activities and objectives focused on in the moment with their individual cultural identity or community context.	▸ Learning takes place through the relationships between people; students transform the knowledge from cultural knowledge to individual knowledge (Jonassen, 1999). ▸ Real-world applications, such as addressing relevant societal issues, link concepts to context (Sutman & Bruce, 1992).	▸ Active participation and student engagement and interest (King, 2012; Cognition and Technology Group at Vanderbilt, 1992) ▸ Transfer of skill (far and high road transfer) (Perkins & Salomon, 1992; King, 2012)	**Bring student's culture into learning:** ▸ Teachers should build bridges between family, community, and students (Ladson-Billings, 1995). ▸ Learning opportunities should involve a social community which replicates real-world situations—students learn through interaction with and testing of new knowledge and skills in the community (Collins et al, 1989; Jonassen, 1999).

Relevance

REFERENCES

Anderson, J. R., Reder, L. M., & Simon, H.A. (1996). Situated learning and education. *Educational Researcher, 25*(4), 5-11.

Authentic Learning. (2013). In S. Abbott (Ed.), *The glossary of education reform.* Retrieved from http://edglossary.org/authentic-learning/.

Bransford, J.D. et al. (1990). Anchored instruction: Why we need it and how technology can help. In D. Nix & R. Sprio (Eds), *Cognition, education and multimedia.* Hillsdale, NJ: Erlbaum Associates.

Cognition and Technology Group at Vanderbilt. (1992). Anchored instruction in science and mathematics: Theoretical basis, developmental projects, and initial research findings. In R. A. Duschl & R. J. Hamilton (Eds.), *Philosophy of Science, cognitive psychology, and educational theory and practice,* 244-273. Albany, NY: State University of New York Press.

Collins, A., Brown, J. S., & Newman, S. (1989). Cognitive apprenticeship: Teaching the craft of reading, writing, and mathematics. *Technology Report, 403.* Palo Alto, CA: Institute for Research on Learning.

Frymier, A.B. & Shulman, G.M. (1995). What's in it for me? Increasing content relevance to enhance students' motivation. *Communication Education, 44*, 40-50.

Jonassen, D. H. (1999). Designing constructivist learning environments. In C. M. Reigeluth (Ed.), *Instructional design theories and models: A new paradigm of instructional theory,* 217-239. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

King, D. T. (2012). New perspectives on context-based chemistry education: using a dialectical socio-cultural approach to view teaching and learning. *Studies in Science Education, 48*(1), 51-87.

Ladson-Billings, G. J. (1995). Toward a theory of culturally relevant pedagogy. *American Education Research Journal, 35*, 465-491.

Lave, J. & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation.* Cambridge: Cambridge University Press.

Perkins, D. N. & Salomon, G. (1992). Transfer of Learning. In *International Encyclopedia of Education,* 2. Oxford, England: Pergamon Press.

Relevance. (2013). In S. Abbott (Ed.), *The glossary of education reform.* Retrieved from http://edglossary.org/relevance/.

Rogers, C. (1969). *Freedom to learn.* Columbus, OH: Merrill.

Rivet, A. E. & Krajcik, J. S. (2008). Contextualizing instruction: Leveraging students' prior knowledge and experiences to foster understanding of middle school science. *Journal of Research in Science Teaching, 45*(1), 79-100.

Stein, D. (1998). Situated learning in adult education (ERIC Digest No. 195). Washington, DC: ERIC Clearinghouse. (ERIC Documentation Reproduction Service No. ED418250).

Sutman, F. & Bruce, M. (1992). Chemistry in the community—ChemCom: A five year evaluation. *Journal of Chemical Education, 69*(7), 564-56.

Webster, C., Mîndrilă, D., & Weaver, G. (2011). The influence of state motivation, content relevance and affective learning on high school students' intentions to use class content following completion of compulsory physical education. *Journal of Teaching in Physical Education, 30*(3), 231-247.

Yeager, D., Henderson, M. D., Paunesku, D., Walton, G. M., D'Mello, S., Spitzer, B., & Duckworth, A. L. (2014). Boring but important: A self-transcendent purpose for learning fosters academic self-regulation. Journal of Personality and Social Psychology, 107, 559–580.

Collaboration

RESEARCH SUMMARY

Students work together to create a joint product, cooperatively solve a problem, or co-construct their understanding of a topic.

Collaborative learning involves groups of students working together to create a joint product, cooperatively solve a problem, or co-construct their understanding of a topic. The literature distinguishes between cooperative and collaborative learning, with cooperative learning involving a task that can be decomposed into individual independent subtasks and collaborative learning involving a task that must be completed as one shared group task (Cohen, 1994; Watkins et al., 2007). However, more often the two terms are used interchangeably and align with the latter definition. In truly collaborative contexts, students believe that they can only achieve goals if others in the group also reach their goals (Johnson & Johnson, 1999). As a result, students must support one another's learning by explaining, examining, and reconciling their multiple perspectives through conversation, as well as by giving help to and seeking help from peers (Watkins et al., 2007). Collaborative learning is an alternative to competitive learning, where students believe that they can obtain their goals only if others fail, and individualistic learning, where students believe that the achievement of their goals is unrelated to others' achievement (Johnson et al., 1991).

▶ **Positive Interdependence:** Students working in groups have essential and complementary roles that allow them to make progress towards a shared goal on a group worthy task.

▶ **Individual Accountability:** Students working in groups engage fully in learning activities and do not rely on others to do the hard work for them ensuring everyone individually achieves learning objectives.

▶ **Interpersonal Skills:** Students working in groups deploy the social awareness and interpersonal skills needed to successfully collaborate, including the abilities to empathize, listen actively, relate across lines of difference, communicate respectfully and clearly, resolve conflicts, and both seek and offer help when appropriate.

▶ **Promotive Interactions:** Students working in groups support and build off of one another's thinking to deepen engagement with the activities and enhance understanding of the related content and skills.

▶ **Group Processing:** Students reflect on group work, describe group member actions that were helpful and unhelpful to maintaining effective working relationships and achieving goals, and make logical decisions about what to continue or change.

The importance of collaboration to learning is explained by a number of interrelated theories. These theories primarily focus on the mediating mechanisms of motivation and cognitive development. Some motivational theories argue that the incentive structures that are a part of collaborative learning foster positive interdependent relationships between group members stemming from members realizing they can only attain their own goals if everyone in the group also succeeds. This in turn motivates the group members not only to learn the material, but also to help other group members do the same (Johnson & Johnson, 1992; Slavin, 1995; Johnson, Johnson & Smith, 1998; Panitz, 1999). Social constructivist theory also argues that motivation is a key driver of achievement activated by collaboration, but that it is activated by the cohesiveness of the group and learners' desire to take care of one another, as opposed to their desire to take care of themselves (Sharan & Sharan, 1992; Cohen, 1994). Cognitive theorist have developed both a developmental perspective that builds off of Vygotsky's concept of the zone of proximal development (ZPD) and the more knowledgeable other (MKO), as well as an elaborative perspective that extends from Piaget's social learning theory. The cognitive developmental theory argues that within groups learners are able to model more advanced behaviors and thinking than they could perform alone because they are engaging with other learners at similar but not identical developmental levels (Vygotsky, 1978; Dillenbourg, 1999). The cognitive elaboration theory holds that interacting with peers allows learners to explain, test, and refine their thinking in order to form new mental models or schema (Woolfolk, 1987; van Boxtel et al., 2000). While some researchers have sought to demonstrate that either motivation or cognition alone can mediate the relationship between collaboration and achievement, most argue it is likely a complex mixture of both. The group goals and processes used during collaboration increase motivation to learn and/or motivation to support other's learning. This increased motivation leads to more active engagement with collaborative tasks that further cognitive development, which in turn improves achievement (Slavin, 1995).

TABLE: RESEARCH-BASED ELEMENTS OF COLLABORATION

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Positive Interdependence: Students working in groups have essential and complementary roles that allow them to make progress towards a shared goal on a group worthy task.	When an individual's performance is dependent on the performance of others in the group, they must coordinate their own efforts with the efforts of others to ensure each group member participates in the process and achieves the targeted outcomes, which encourages more effective collaboration and in turn improves outcomes (Johnson & Johnson, 2009).	‣ Perspective taking (Johnson & Johnson, 1983) ‣ Self-esteem (Johnson & Johnson, 1983) ‣ Interpersonal relationships (Johnson & Johnson, 1983) ‣ Academic achievement (Johnson & Johnson, 1983; Johnson & Johnson, 2009; Hattie, 2009)	**Foster different forms of interdependence:** ‣ Goal interdependence can be fostered by having students work to create a single product or come to a consensus answer (Johnson & Johnson, 2009). ‣ Reward interdependence can be fostered by ensuring the same recognition, grade, etc. is given to everyone in the group (Johnson & Johnson, 2009). ‣ Resource interdependence can be fostered by distributing the specific tools, knowledge, or skills needed to complete the work across different students in the group (Johnson & Johnson, 2009). ‣ Role interdependence can be fostered by assigning specific roles to group member (Johnson & Johnson, 2009). ‣ Task interdependence can be fostered by designing activities that require one student to complete their task first before the next task can be completed (Johnson & Johnson, 2009).
Individual Accountability: Students working in groups engage fully in learning activities and do not rely on others to do the hard work for them ensuring everyone individually achieves learning objectives.	Individual accountability motivates each group member to actively engage in learning tasks. thus preventing "social loafing," or one group member benefiting off the actions of others, and ensures each member of the group becomes individually stronger (Johnson & Johnson, 2009).	‣ Perspective taking (Johnson & Johnson, 1983) ‣ Self-esteem (Johnson & Johnson, 1983) ‣ Interpersonal relationships (Johnson & Johnson, 1983) ‣ Academic achievement (Johnson & Johnson, 1983; Johnson & Johnson, 2009; Hattie, 2009)	**Ensure all individuals are contributing and learning:** ‣ Try to keep group sizes small, ideally less than four. ‣ Evaluate all group members individually or randomly select one group member to be assessed for the group. ‣ Track individual contribution to team decisions. ‣ Observe the frequency and quality of group member participation. **Help students hold each other accountable:** ‣ Couple individual accountability with positive interdependence to avoid competitive or individualistic behaviors and further support promotive interactions. ‣ Assign a checker to each group to assess peers' understanding. ‣ Have students teach someone what they've learned.

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Interpersonal Skills: Students working in groups deploy the social awareness and interpersonal skills needed to successfully collaborate, including the abilities to empathize, listen actively, relate across lines of difference, communicate respectfully and clearly, resolve conflicts, and both seek and offer help when appropriate.	Collaboration is complex and requires students to have the socials skills to: ▸ Get to know and trust each other; ▸ Communicate accurately and unambiguously; ▸ Accept and support each other; and ▸ Resolve conflicts constructively (D. W. Johnson, 2003; Johnson & Johnson, 2009).	▸ Perspective taking (Johnson & Johnson, 1983) ▸ Self-esteem (Johnson & Johnson, 1983) ▸ Interpersonal relationships (Johnson & Johnson, 1983) ▸ Academic achievement (Johnson & Johnson, 1983; Johnson & Johnson, 2009; Hattie, 2009)	**Support the development of social skills:** ▸ Provide direct instruction on important skills like empathy, effective communication, conflict resolution, etc (Putnam, Rynders, Johnson, and Johnson. 1989). ▸ Consider providing group recognition or rewards for individual demonstrations of positive social skills (Mesch et al., 1988). ▸ Provide regular individual feedback to students on their development (Archer-Kath et al., 1994; Putnam et al., 1989).
Promotive Interactions: Students working in groups support and build off of one another's thinking to deepen engagement with the activities and enhance understanding of the related content and skills.	Promotive interactions are key to improved achievement from collaborative. To ensure all group members are successful, individuals must provide one another with efficient and effective cognitive and motivational support. ▸ Cognitive support engages group members in construction dialogue and critical thinking . ▸ Motivational support enhances engagement with learning tasks, and in turn further supports the cognitive processes described above (Johnson & Johnson, 2009).	▸ Perspective taking (Johnson & Johnson, 1983) ▸ Self-esteem (Johnson & Johnson, 1983) ▸ Interpersonal relationships (Johnson & Johnson, 1983) ▸ Academic achievement (Johnson & Johnson, 1983; Johnson & Johnson, 2009; Hattie, 2009)	**Promote positive and constructive interactions:** ▸ Group interactions should be carefully planned to balance interdependence and individual accountability (Kaendler, Wiedmann, Rummel, & Spada, 2014). ▸ Group interactions should be observed and support should be provided as needed (Kaendler, Wiedmann, Rummel, & Spada, 2014). ▸ The synthesis and consolidation of group members' ideas should be encouraged and supported (Kaendler, Wiedmann, Rummel, & Spada, 2014). ▸ Opportunities for group processing and reflecting should be incorporated (Kaendler, Wiedmann, Rummel, & Spada, 2014).

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Group Processing: Students reflect on group work, describe group member actions that were helpful and unhelpful to maintaining effective working relationships and achieving goals, and make logical decisions about what to continue or change.	Group processing clarifies and improves the effectiveness of collaboration by: ▸ Enabling groups to improve the quality of members' work; ▸ Facilitating the learning of teamwork skills; ▸ Ensuring that members receive feedback on their participation; and ▸ Enabling groups to focus on group maintenance (Johnson & Johnson, 2009; D. W. Johnson, 2003; Johnson & Johnson, 2000; D. W. Johnson et al., 1998).	▸ Perspective taking (Johnson & Johnson, 1983) ▸ Self-esteem (Johnson & Johnson, 1983) ▸ Interpersonal relationships (Johnson & Johnson, 1983) ▸ Academic achievement (Johnson & Johnson, 1983; Johnson & Johnson, 2009; Hattie, 2009)	**Ensure opportunities for group processing:** ▸ Incorporate opportunities for groups to stop and reflect throughout the day. ▸ Provide scaffolds to support group processing, such as prompts and protocols. **Promote high-quality reflections and feedback:** ▸ Participate in group processing along with group members. ▸ Provide whole group feedback alongside individual feedback (Archer-Kath et al., 1994; D. W. Johnson et al., 1990; Yager et al., 1985).

Collaboration RESEARCH SUMMARY

REFERENCES

Archer-Kath, J., Johnson, D. W., & Johnson, R. (1994). Individual versus group feedback in cooperative groups. *Journal of Social Psychology, 134*(5), 681-694.

Chiu, M. M. (2000). Group problem-solving processes: Social interactions and individual actions. *Journal for the Theory of Social Behaviour*, *30*(1). Oxford: Blackwell Publishers.

Cohen, E. G. (1994). Restructuring the classroom: Conditions for productive small groups. *Review of Educational Research*, *64*(1), 1-35.

Cole, M. (1985). The zone of proximal development: where culture and cognition create each other. In J. V. Wertsch (Ed.), *Culture, communication, and cognition: Vygotskian perspectives,* 146-161. Cambridge University Press.

Dillenbourg, P., Baker, M., Blaye, A., & O'Malley, C. (1996). The evolution of research on collaborative learning. In E. Spada & P. Reiman (Eds.), *Learning in humans and machine: Towards an interdisciplinary learning science*, 189-211. Oxford: Elsevier.

Dillenbourg P. (1999). What do you mean by collaborative learning? In P. Dillenbourg (Ed.), *Collaborative-learning: Cognitive and computational approaches*, 1 - 19. Oxford: Elsevier.

Draper, D. C. (2015). Collaborative instructional strategies to enhance knowledge convergence. *American Journal of Distance Education*, *29*(2), 109-125.

The Foundation Coalition. (2004). *Positive interdependence, individual accountability, promotive interaction: Three pillars of cooperative learning*. USA: FC Brochure.

Gokhale, A. A. (1995). Collaborative learning enhances critical thinking. *Journal of Technology Education*, *7*(1), 22-30.

Goodsell, A.M., Maher, M., & Tinto, V. (Eds). *Collaborative learning: A sourcebook for higher education*. National Center on Postsecondary Teaching, Learning and Assessment.

Hattie, J. (2009). *Visible learning for teachers: Maximizing impact on learning*. New York, NY: Routledge.

Kelly, J. (2002). Collaborative learning: Higher education, interdependence, and the authority of knowledge by Kenneth Bruffee: A critical study. *Journal of the National Collegiate Honors Council—Online Archive*, Paper 82.

Johnson, D. W. (2003). Social interdependence: The interrelationships among theory, research, and practice. *American Psychologist, 58*(11), 931-945.

Johnson, D. W. & Johnson, R. T. (1979). Conflict in the classroom: Controversy and learning. *Review of Educational Research*,

46(1), 51-69.

Johnson, D. W. & Johnson, R. T. (1983). Effects of cooperative, competitive, and individualistic learning experiences on social development. *Exceptional Children*, *49*(4), 323-329.

Johnson, D. W. & Johnson, R. T. (1996). Cooperation and the use of technology. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology*, 1017-1044. New York: Simon and Schuster Macmillan.

Johnson, D. W. & Johnson, R. T. (1999). *Learning together and alone: Cooperative, competitive, and individualistic learning*. Boston: Allyn & Bacon. First edition, 1975.

Johnson, D. W. & Johnson, R. T. (2002). Learning together and alone: Overview and meta-analysis. *Asia Pacific Journal of Education*, *22*(1), 95-105.

Johnson, D.W. & Johnson, F. (2003). *Joining together: Group theory and research* (8th ed.). Boston, MA: Allyn & Bacon.

Johnson, D. W. & Johnson, R. T. (2009). An educational psychology success story: Social interdependence theory and cooperative learning. *Educational Researcher*, *38*(5), 365-379.

Johnson, D. W., Johnson, R. T., & Smith, K. A. (1991). *Cooperative learning: Increasing college faculty instructional productivity (ASHE-ERIC Higher Education Report No. 4)*. Washington, D.C.: The George Washington University, School of Education and Human Development.

Johnson, D. W., & Johnson, R. (1992). Positive interdependence: Key to effective cooperation. In R. Hertz-Lazarowitz & N. Miller (Eds.), *Interaction in cooperative groups: The theoretical anatomy of group learning*. New York: Cambridge University Press.

Johnson, D. W., Johnson, R. T., & Smith, K. A. (1998). Cooperative learning returns to college. *Change: The Magazine of Higher Learning*, *30*(4): 26-35.

Johnson, D. W., Johnson, R. T., & Smith, K. A. (2000). Constructive controversy: The educative power of intellectual conflict. *Change: The Magazine of Higher Learning*, *32*(1), 28-37.

Johnson, D. W., Johnson, R. T., & Stanne, M. E. (2000). Cooperative learning methods: A meta-analysis. Minneapolis: University of Minnesota Press.

Kaendler, C. Wiedmann, M., Rummel, N., & Spada, H. (2014). Teacher competencies for the implementation of collaborative learning in the classroom: A framework and research review. *Educational Psychology Review, 27*(3). 505-536.

Kagan, S. (1989). The structural approach to cooperative learning.

Educational Leadership, *47*(4), 12-15.

Kirschner, P. A., Strijbos, J. W., Kreijns, K., & Beers, P. (2004). Designing electronic collaborative learning environments. *Educational Technology Research and Development*, *52*(3), 47-66.

Kyndt, E., Raes, E., Lismont, B., Timmers, F., Cascallar, E., & Dochy, F. (2013). A meta-analysis of the effects of face-to-face cooperative learning. Do recent studies falsify or verify earlier findings? *Educational Research Review*, *10*(2013), 133-149.

Laal, M., & Ghodsi, S. M. (2012). Benefits of collaborative learning. *Procedia-Social and Behavioral Sciences*, *31*, 486-490.

Lou, Y., Abrami, P. C., Spence, J. C., Poulsen, C., Chambers, B., & d'Appolonia, S. (1996). Within-class grouping: A meta-analysis. *Review of Educational Research*, *66*(4), 423-458.

McLaren, B. (2014). *Wiley Whitepaper: What Happens When We Learn Together: A Research-Based Whitepaper on the Power of Collaborative Learning*. Hoboken, NJ: John Wiley & Sons.

Murphy, P. K., Soter, A. O., Wilkinson, I. A. G., Hennessey, M. N., & Alexander, J. F. (2009). Examining the effects of classroom discussion on students' comprehension of text: A meta-analysis. *Journal of Educational Psychology*, *101*(3), 740-764.

Panitz, T. (1999). The motivational benefits of cooperative learning. *New Directions for Teaching and Learning, 78,* 59-67.

Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education*, *93*(3), 223-231.

Putnam, J.W., Rynders, J.E., Johnson, R.T., & Johnson D.W. (1989). Collaborative skill instruction for promoting positive interactions between mentally handicapped and nonhandicapped children. *Expert Child, 55*(6), 550-557.

Roschelle, J. (1992). Learning by collaborating: Convergent conceptual change. *The Journal of the Learning Sciences*, *2*(3), 235-276.

Sharan, Y., & Sharan, S. (1992). Group investigation expands cooperative learning. *Educational leadership*, *47*(4), 17-21.

Slavin, R. E. (1981). Synthesis of Research on Cooperative Learning. *Educational leadership*, *38*(8), 655-660.

Slavin, R. E. (1995). *Research on cooperative learning and achievement: What we know, what we need to know*. Johns Hopkins University: Center for Research on the Education of Students Placed at Risk.

Smith, K. A., Sheppard, S. D., Johnson, D. W., & Johnson, R. T. (2005). Pedagogies of engagement: Classroom-based practices. *Journal of Engineering Education, 94*(1), 87-101.

Stahl, R. J. (1994). The essential elements of cooperative learning in the classroom. *ERIC Digest*.

Tsay, M. & Brady, M. (2010). A case study of cooperative learning and communication pedagogy: Does working in teams make a difference? *Journal of the Scholarship of Teaching and Learning*, *10*(2), 78-89.

Tudge, J. R. H. (1992). Processes and consequences of peer collaboration: A Vygotskian analysis. *Child Development*, *63*(6), 1364-1379.

van Boxtel, C., van der Linden, J., & Kanselaar, G. (2000). Collaborative learning tasks and the elaboration of conceptual knowledge. *Learning and Instruction*, *10*(4), 311-330.

Vygotsky, L.S. (1978). *Mind in society: The development of higher psychological processes*. Massachusetts: Harvard University Press.

Watkins, C., Carnell, E., & Lodge, C. (2007). *Effective learning in classrooms*. London: Paul Chapman Publishing.

Webb,. N. M., Nemer, K. M., Chizhik, A. W., & Sugrue, B. (1998). Equity issues in collaborative group assessment: Group composition and performance. *American Educational Research Journal*, *35*(4), 607-651.

Woolfolk, A. E. (1987). *Educational psychology* (3rd ed.). Englewood Cliffs, NJ, US: Prentice-Hall, Inc.

Yager, S., Johnson, D. W., & Johnson, R. T. (1985). Oral discussion, group-to-individual transfer, and achievement in cooperative learning groups. J*ournal of Educational Psychology, 77*(1), 60-66.

Community

RESEARCH SUMMARY

Students are deeply known as individuals and are part of a learning environment that is positive, secure, and open to all backgrounds and perspectives.

The principle of Community focuses on the environment in which learning occurs and emphasizes the importance of students being deeply known as individuals and experiencing a learning environment that is positive, secure, and open to all backgrounds and perspectives. The *Instructional Look Fors* further define the principle through five subconcepts:

▸ **Belonging:** Students feel and demonstrate that they are part of a community with shared values and beliefs, as well as appreciation for each individual's unique ideas, perspectives, and backgrounds.

▸ **Joy:** Students experience positivity, warmth, and joy in the learning environment.

▸ **Equitable Engagement:** Students voice ideas and perspectives freely and equitably, ensuring each individual is an active contributor to the community.

▸ **Connectedness:** Students have positive relationships with both peers and with adults who act as role models and provide students with emotional support when needed so that students feel seen, heard, safe, and known.

▸ **Upholding Norms:** Students understand and uphold norms to maintain physical and emotional safety and predictability in the environment.

These subconcepts were informed by literature on school and classroom climate. Climate is often broken into three categories: the emotional climate, the organizational climate, and the instructional climate (Pianta, La Paro, & Hamre, 2008). While each of these categories is covered in the C2D2 Framework, the focus of the Community principle is largely the emotional climate, or how students feel within the environment, and to a lesser extent the organizational climate, or how learning time and the learning space are structured. These topics are essential to the development of a positive climate and subsequently to learning because emotions play a role in governing both behavior and cognition (Appleton et al., 2008; Immordino-Yang & Damasio, 2007). More specifically, negative emotions such as anxiety or insecurity can inhibit interest, enjoyment, and engagement in school while feelings of psychological safety, trust, confidence, and happiness can promote these positive outcomes (Curby et al., 2009; Wentzel, 1998; Woolley et al, 2009). Fostering a positive climate is supported by meeting a student's need for closeness to others and by meeting a student's need for feelings of competence and control regarding how to be successful in school (Appleton, Christenson, & Furlong, 2008). These ideas are discussed in more detail below in table.

TABLE: RESEARCH-BASED ELEMENTS OF COMMUNITY

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Belonging: Students feel and demonstrate that they are part of a community with shared values and beliefs, as well as appreciation for each individual's unique ideas, perspectives, and backgrounds.	Psychology and learning theories suggest a sense of belonging or psychological membership is a fundamental human need (Maslow, 1962). These theories suggest belonging influences emotional engagement with and motivation to complete everyday activities (Winer, 1990). This includes engagement with school (Finn, 1989; Wehlage, 1989)	▶ Higher academic standards for self (Gillen-O'Neel & Fuligni, 2013) ▶ Feelings that school is useful and enjoyable (Gillen-O'Neel & Fuligni, 2013) ▶ Choosing more complex learning activities (Howes & Smith, 1995) ▶ Higher academic performance (Rimm-Kaufman & Chiu, 2007; Wentzel, 1998; LaRocque & Mvududu, 2008, LeBaron-Wallace & Ye, 2012) ▶ Sense of belonging also mediates the link between positive student-teacher relationship and their affective experience in school (LeBaron-Wallace et al., 2012)	**Create routines that support physical and emotional security:** ▶ Plan deliberate community building activities such as routine morning meetings or celebrations (Battistitch, et al, 2006). ▶ Build periods into the day for social/emotional care ("pastoral care") and/or using other strategies to demonstrate that pastoral care is a priority (Lester et al., 2013). ▶ Create welcoming and well-maintained learning environments (Lester et al., 2013; Rowe & Stewart, 2007). ▶ Take steps to ease students' transitions from primary to secondary school (Lester et al., 2013). ▶ Help students be kind, helpful and understanding of one another (Bergin & Bergin, 2009). **Bring families into the learning process:** ▶ Encourage parental involvement in school and "homeside activities" that introduce families, perspectives, cultures, and values into learning activities (Battistitch et al, 2006; Thompson et al, 2011). **Respond to the unique needs of adolescents:** ▶ Adolescents are particularly sensitive to being judged broadly or based on stereotypes. These negative experiences have significant impacts on students, feelings of belonging and connection to a teacher (LeBaron-Wallace et al., 2012).

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Joy: Students experience positivity, warmth, and joy in the learning environment.	Neuroscience indicates that positive emotions support learning by enabling memory consolidation: ▸ When classroom activities are pleasurable, the brain releases a neurotransmitter called dopamine, believed to stimulate the memory centers and promote the release of acetylcholine, another neurotransmitter which may increase attention (Willis, 2007). ▸ In the hippocampus (an area of the brain associated with memory consolidation), there is evidence that dopamine activates cell receptors. Long term potentiation (the mechanism through which many scientists believe memory is stored) is seen at excitatory synapses on hippocampal cells (Wise, 2004).	▸ Greater information transmission and storage in the brain (Thanos et al., 2001) ▸ Greater ability to recall details (Talarico et al., 2009) ▸ Heightened attention (Willis, 2007) ▸ Memory consolidation (Wise, 2004)	**Reduce stress in the learning environment:** ▸ Students should have opportunities to take breaks, such as a 3 minute break between lessons, recess, music class, lunchtime, etc. (Willis, 2007). ▸ Students should be supported to develop learning and study skills, such as prioritizing information (Willis, 2007). ▸ Time should be made for independent discovery learning so learning is relevant and interesting and because students are more likely to remember what they learn if they find it compelling (Willis, 2007). ▸ The school should feel like a safe haven and be a positive emotional environment (Willis, 2007). **Create a pleasant classroom environment:** ▸ Enable students to study a topic of their own choosing, ideally though inquiry-based investigation (Wolk, 2008). ▸ Ensure students have opportunities to create (Wolk, 2008). ▸ Show off student work in the classroom/around the school (Wolk, 2008). ▸ Make the space inviting (Wolk, 2008). ▸ Get students outside (Wolk, 2008). ▸ Support students in reading good books that they love (Wolk, 2008). ▸ Provide extracurricular activities and non-core subject classes throughout the day including gym, art and music (Wolk, 2008). ▸ Transform assessment by portraying failure as an opportunity to learn and offering different types of assessments such as portfolios (Wolk, 2008). **Punctuate learning with moments of joy:** ▸ Incorporate fun and games to capitalize on the fact that kids love challenges and competition (Lemov, 2010). ▸ Consider bringing drama, song, and dance into the school and classroom--music and dance are uplifting and can help students recall information (Lemov, 2010). ▸ Foster humor--laughter is a base condition for happiness and fulfillment (Lemov, 2010). ▸ Suspense, surprise, and variation in routine can be powerful and motivating (Lemov, 2010).

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Equitable Engagement: Students voice ideas and perspectives freely and equitably ensuring each individual is an active contributor to the community.	Engagement is the mechanism that translates motivation into learning. It is what a student actually thinks, feels, or does that leads to new knowledge, habits, and dispositions. It is commonly divided into four categories: ▸ Academic engagement ▸ Behavioral engagement ▸ Cognitive engagement ▸ Psychological engagement Engagement is characterized by students paying greater attention in school, looking more interested, and demonstrating greater persistence than disengaged peers (Klem & Connell, 2004). Engagement can be a virtuous cycle. Students who are engaged and receive positive reinforcement, such as enjoyment or success in one situation are more apt to be engaged in other places, and at other times, as well (Appleton, 2008).	▸ Academic performance (Klem & Connell, 2004; Connell, Spencer, & Aber 1994; Goodenow, 1993; Willingham, Pollack, & Lewis, 2002). ▸ Positive student behavior (Klem & Connell, 2004). ▸ Sense of belonging and connection to school (Fredricks, Blumenfeld, & Paris, 2004).	**Encourage high-quality participation and ensure students have a voice:** ▸ Use student-centered approaches that allow students to have a voice in what they learn and how they learn it (Rowe & Stewart, 2007). ▸ Involve students in the school's decision making process (Rowe & Stewart, 2007). ▸ Encourage student participation in extracurricular activities (Brown & Evans 2002; Lester et al., 2013; Gillen-O'Neel & Fuligni, 2013). ▸ Small group work, class discussions, cooperative learning activities (especially those involving small, heterogeneous groups of mixed-level students), shared tasks, and peer tutoring (Rowe & Stewart, 2007). ▸ Hold all students to high academic expectations (Lester et al., 2013) ▸ Create co-operative and/or democratic rule setting (Rowe & Stewart, 2007). ▸ Ensure there are plenty of extracurricular opportunities open to all; research shows that fewer extracurriculars are made available to girls, and girls are at a higher risk for not feeling a sense of belonging in high school (Gillen-O'Neel & Fuligni, 2013). ▸ Work to address any reduced feelings of connectedness associated with schools that have a racially heterogeneous mix of students (Rowe & Stewart, 2007).

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Connectedness: Students have positive relationships with peers and adults who act as role models and provide students with emotional support when needed so that students feel seen, heard, safe, and known.	Various theories of learning and development highlight the importance of connectedness--often referenced in research as positive interpersonal relationships, secure attachments, and relatedness--to desired student outcomes such as self-concept, motivation, engagement, and academic success (Bergin & Bergin, 2009; Connell & Wellborn, 1991; Ryan & Deci, 2000). ▸ These relationships provide students with a feeling of being close to and cared for by others. ▸ They can model and teach students the beliefs and behaviors needed for success in their environments. In addition, they can buffer against stress, which can inhibit learning (Argyle, 1999). In order to be effective, teachers must connect with students and care for them with warmth, respect, and trust. This is seen as being easier to accomplish in preschool and elementary grades and much more research exists for this group.	▸ Interest, enjoyment, and engagement in school (Curby et al., 2009; Marks, 2000; Rimm-Kaufman, La Paro, Downer, & Pianta, 2005; Skinner & Belmont, 1993; Wentzel, 1998; Woolley, Kol, & Bowen, 2009; Furrer & Skinner, 2003) ▸ Positive social interactions with peers (Bergin & Bergin, 2009) ▸ Academic development and performance (Bergin & Bergin, 2009; Juvonen et al., 2012; Liem & Martin, 2011; Hattier, 2009; Rimm-Kaufman & Chiu, 2007; Wentzel, 1998; LaRocque & Mvududu, 2008) Some research suggests that when parent-child attachments are insecure, teacher-child attachments can have similarly important impacts (Bergin & Bergin, 2009). Outcomes associated with parent-child relationships include: ▸ Willingness to accept challenges and independence ▸ Social competence ▸ Emotional regulation	**Demonstrate respect for and faith in students:** ▸ Use positive language with learners that demonstrates faith in students (Denton, 2007). ▸ Be well-prepared for class and hold high expectations (Bergin & Bergin, 2009). ▸ Provide choice whenever possible (Bergin & Bergin, 2009). ▸ Use reasoned persuasion rather than coercive discipline; discipline that relies on a teacher's power and ability to control resources (like recess) interferes with positive relationships (Bergin & Bergin, 2009). **Get to know students and demonstrate this knowledge:** ▸ Adults should talk with students informally outside of instructional time to get to know them (Marzano & Marzano, 2003). ▸ Adults should greet students by name (Marzano & Marzano, 2003; Lemov, 2010). ▸ Adults should acknowledge important accomplishments and milestones with positive praise (Marzano & Marzano, 2003; Lemov, 2010). ▸ Adults should foster sensitivity and warm and positive interactions with students (Bergin & Bergin, 2009). ▸ Present content in ways that are interesting to students (Bergin & Bergin, 2009). **Work to maintain and repair relationships:** ▸ Implement interventions (ideally with help of school counselor or psychologist) to repair fractured or difficult relationships with specific students (Bergin & Bergin, 2009). ▸ Teacher-student relationships become more difficult to foster as students progress through grades so schools must be attentive to this and adjust their structures and relationship building strategies (Gillen-O'Neel & Fuligni, 2013).

LOOK FORS	UNDERLYING ASSUMPTION	ASSOCIATED STUDENT OUTCOMES	GUIDELINES FOR EFFECTIVE USE
Upholding Norms: Students understand and uphold norms to maintain physical and emotional safety and predictability in the environment.	Developing an orderly classroom environment where students know the behavioral expectations and feel safe prevents negative emotions such as stress, confusion, or anxiety that inhibit learning. ▸ Stress, boredom, confusion or anxiety (or more powerfully, a combination) can interfere with learning (Christianson, 1992). ▸ During periods of stress, information flow to higher cognitive networks is limited, as is the learning process (Willis, 2007). ▸ Efficient learning does not take place when the student is experiencing stress or fear. When a student experiences stress/fear, connections between the emotional brain and the frontal cortex can become impaired, thus having a negative impact on learning. Also, when a part of the limbic system, called the Amygdala, is activated, it can interrupt actions and thought (Goswami, 2004).	▸ Constructive and positive behavior (Cheney, 1989; Vallecorsa, deBettencourt, & Zigmond, 2000) ▸ Engagement (Hattie, 2009; Marzano, 2003) ▸ Academic achievement (Hattie, 2009; Marzano, 2003)	**Be proactive in creating norms for the learning space:** ▸ Work with students to co-create rules and routines that guide general classroom behavior, as well as behavior in specific contexts such as the beginning of the class period, during group work, or when minor disruptions occur (Burden, 2003; Marzano, 2003; Savage 2009). ▸ Build positive behavior upfront versus waiting for negative behavior and correcting or punishing it (Strain & Sainato, 1987) . ▸ Establish and maintain an organized and attractive instructional space (Marzano, 2003). ▸ Provide students with explicit instruction on rules and routines and opportunities to review and be retaught as needed (Burden, 2003; Savage 1999). **Work with students to repair the culture immediately and positively when norms are broken:** ▸ Demonstrate constant awareness of activities and behaviors occurring in the learning environment (Marzano, 2003). ▸ Immediately, calmly, and consistently address behaviors that break established rules and procedures (Marzano, 2003).

REFERENCES

Appleton, J.J, Christenson, S.L. & Furlong, M.J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools*, *45*(5), 369-386.

Argyle, M. (1999). Causes and correlates of happiness. In D. Kahneman, E. Diener, & N. Schwarz (Eds.), *Well-being: The foundations of hedonic psychology* (pp. 353-373). New York, NY, US: Russell Sage Foundation.

Battistich, V., Solomon, D., Watson, M. & Schaps, E. (1997) Caring school communities. *Educational Psychologist, 32*(3), 137-151.

Bergin, C. & Bergin,D. (2009). Attachment in the classroom. *Educational Psychology Review*, 21(2), 141-170.

Brown, R. & Evans, W.P. (2002). Extracurricular activity and ethnicity: Creating greater school connection among diverse student populations. *Urban Education*, *37*(1), 41-58.

Burden, P.R. (2017). *Classroom management: Creating a successful K-12 learning community*. Danvers, MA: John Wiley & Sons, Inc.

Cheney, C. (April, 1989). Preventive discipline through effective classroom management. Paper presented at the Preconvention Training Program " Exploring the Theory/Practice Link in Special Education" at the Annual Convention of the Council of Exceptional Children, San Francisco, CA.

Christianson, S. (1992). Emotional stress and eyewitness memory: A critical review. *Psychological Bulletin*, *112*(2), 284-309.

Connell, J. P., & Wellborn, J. G. (1991). Competence, autonomy, and relatedness: A motivational analysis of self-system processes. In M. R. Gunnar & L. A. Sroufe (Eds.), *The Minnesota symposia on child psychology, Vol. 23. Self processes and development* (pp. 43-77). Hillsdale, NJ, US: Lawrence Erlbaum Associates, Inc.

Connell, J. P., Spencer, M. B., & Aber, J. L. (1994). Educational risk and resilience in African-American youth: Context, self, action, and outcomes in school. *Child Development, 65*(2), 493-506.

Curby K. M., Glazek K., Gauthier I. (2009). A visual short-term memory advantage for objects of expertise. *Journal of Experimental Psychology Human Perception & Performance*, 35(1), 94-107

Denton, P. (2015). *The power of our words: Teacher language that helps children learn.* Turners Falls, MA: Center for Responsive Schools.

Finn, J.D. (1989). Withdrawing from school. *Review of Educational Research*, *59*(2), 117-142.

Fredricks, J.A., Blumenfeld, P.C. & Paris, A.H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*(1), 59-109.

Furrer, C., & Skinner, E. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology, 95*(1), 148-162.

Gillen-O'Neel, C. & Fuligni, A. (2013). A longitudinal study of school belonging and academic motivation across high school. *Child Development*, 84(2), 678-692.

Goodenow, C. (1993). Classroom belonging among early adolescent students: Relationships to motivation and achievement. *The Journal of Early Adolescence, 13*(1), 21-43.

Goswami, U. (2004). Neuroscience, education, and special education. *British Journal of Educational Psychology*, 74(1), 1-14.

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement.* New York, NY: Routledge.

Howes, C., & Smith, E. W. (1995). Relations among child care quality, teacher behavior, children's play activities, emotional security, and cognitive activity in child care. *Early Childhood Research Quarterly, 10*(4), 381-404.

Immordino-Yang, M.H. & Damasio, A. (2007). We feel, therefore we learn: The relevance of affective and social neuroscience to education. *Mind, Brain, and Education, 1*(1), 3-10.

Juvonen, J., Espinoza, G., & Knifsend, C. (2012). The role of peer relationships in student academic and extracurricular engagement. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 387-401). New York, NY, US: Springer Science + Business Media.

Klem, A.M. & Connell, J.P. (2004). Relationships matter: Linking teachers support to student engagement and achievement. *Journal of School Health*, *74*(7), 262-273.

LaRocque, M. & Mvududu, N. (2009). "Assessing perceptions of the environment in elementary classrooms: The link with achievement": Corrigendum. *Educational Psychology in Practice, 25*(1), 95.

LeBaron-Wallace, T.L., Ye, F., & Chhuon, V. (2012). Subdimensions of adolescent belonging in high school. *Applied Developmental Science*, 16(3), 122-139.

Lemov, D. (2010). *Teach like a champion: 49 techniques that put students on the path to college*. San Francisco, CA: Jossey-Bass.

Lester, L., & Cross, D. (2015). The relationship between school climate and mental and emotional wellbeing over the transition from primary to secondary school. *Psychology of Well-Being*, *5*(1), 9.

Lester, L., Waters, S. & Cross, D. (2013). The relationship between school connectedness and mental health during the transition to secondary school: A path analysis. *Australian Journal of Guidance and Counselling, 23*(2), 157-171.

Liem, G.A. & Martin, A.J. (2011). Peer relationships and adolescents' academic and non-academic outcomes: same-sex and opposite-sex peer effects and the mediating role of school engagement. *British Journal of Educational Psychology*, *81*(2), 183-206.

Marks, H.M. (2000). Student engagement in instructional activity: Patterns in the Elementary, middle, and high school years. *American Educational Research Journal, 37(1),* 153-184.

Marzano, R.K. (2003). *What works in schools: Translating research in action.* Alexandria: VA, Association for Supervision and Curriculum Development.

Maslow, A.H. (1962). Lesson from the peak-experiences. *Journal of Humanistic Psychology*, *2*(1), 9-18.

Newmann, F. & G. Wehlage, G. (1993). Five standards of authentic instruction. *Educational Leadership*, *50*(7), 8012.

Pianta, R. C., La Paro, K. M., & Hamre, B. K. (2008). *Classroom assessment scoring system™: Manual K-3.* Baltimore, MD, US: Paul H Brookes Publishing.

Rimm-Kaufman, S.E. & Chiu, Y.I. (2007). Promoting social and academic competence in the classroom: An intervention study examining the contribution of the *Responsive Classroom* approach. *Psychology in Schools*, *44*(4), 397-413.

Rimm-Kaufman, S. E., Curby, T. W., Grimm, K. J., Nathanson, L., & Brock, L. L. (2009). The contribution of children's self-regulation and classroom quality to children's adaptive behaviors in the kindergarten classroom. *Developmental Psychology, 45*(4), 958-972.

Rowe, F.N. & Stewart, D.E. & Patterson, C. (2007). Promoting connectedness through whole-school approaches. *Health Education*, *107*(6), 524-542.

Ryan, R. M. & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68-78.

Savage, T. V. (1999). *Teaching self-control through management and discipline.* Boston: Allyn and Bacon.

Skinner, E. A., & Belmont, M. J. (1993). Motivation in the classroom: Reciprocal effects of teacher behavior and student engagement across the school year. *Journal of Educational Psychology, 85*(4), 571-581.

Strain, P.S. & Sainato, D.M. (1987). Preventive discipline in early childhood. *Teaching Exceptional Children*, *19*(4), 26-30.

Talarico, J.M., Berntsen, D. & Rubin, D.C. (2009) Positive emotions enhance recall of peripheral details. *Cognition and Emotion*, 23(2), 380-398.

Thanos P.K., Volkow N.D., Freimuth P., Umrgaki H., Ikari H., Roth G., Ingram D.K., & Hitzemann R. (2001). Overexpression of dopamine D2 receptors reduces alcohol self-administration. *Journal of Neurochemistry, 78*(5), 1094-1103.

Thompson, A. M., Macy, R. J., & Fraser, M. W. (2011). Assessing person-centered outcomes in practice research: a latent transition profile framework. *Journal of Community Psychology, 39*(8), 987-1002.

Vallecorsa, A.L., deBettencourt, L.U. & Zigmond, N. (2000). *Students with mild disabilities in general education settings: A guide for special educators.* Boston, MA: Pearson.

Wehlage, G.G. (1989). *Reducing the risk: Schools as communities of support*. Philadelphia, PA: The Falmer Press.

Wentzel, K. R. (1998). Social relationships and motivation in middle school: The role of parents, teachers, and peers. *Journal of Educational Psychology, 90*(2), 202-209.

Willingham, W. W., Pollack, J. M., & Lewis, C. (2002). Grades and test scores: Accounting for observed differences. *Journal of Educational Measurement, 39*(1), 1-37.

Willis, J. (2007). *Brain-friendly strategies for the inclusion classroom*. Alexandria: VA, Association for Supervision and Curriculum Development.

Wise, R. (2004). Dopamine, learning, and motivation. *Nature Reviews Neuroscience, 5*, 483-494.

Wolk, S. (2008). Joy in school. *Educational Leadership*, *66*(1), 8-15.

Woolley, M.E., Kol, K,L. & Bowen, G.L. (2009). The social context of school success for latino middle school students: Direct and indirect influences of teachers, family, and friends. *The Journal of Early Adolescence*, *29*(1), 43-70.