Developing Students as Critical Thinkers
Written by Sandra L. Love, Ed.D.
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Introduction
Developing critical thinking skills in the 21st century is more important than ever before. Each year the world seems to increase in complexity. With a wide range of information at the fingertips of students, learning how to process information is crucial. Developing students as critical thinkers equips them to face and deal with challenges they will most likely encounter in an uncertain future. With this in mind, it stands to reason that schools place critical thinking at the center of instruction. All individuals can be taught to think critically. Beginning in the early years, critical thinking must be nurtured and encouraged throughout K-12 education. Critical thinking includes cognitive skills and habits of mind. While there is not general agreement on a single definition, there is consensus on the importance of critical thinking as a life-long skill. This paper will focus on the aspect of critical thinking in education. Hopefully, educators will recognize the need for and accept the responsibility of developing students as critical thinkers.
Critical Thinking Definitions

The challenge of defining critical thinking is an ever present issue since the early times of Socrates, Plato, and Aristotle. The definitions in existence differ, depending on whether they are philosophical, psychological, or educational in nature.

The philosophical viewpoint is represented by Richard Paul, Linda Elder, and Michael Scriven. The National Council for Excellence in Critical Thinking supports critical thinking in the manner presented by these individuals. In 1987, Paul and Scriven released a statement regarding critical thinking. “Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action.”

Paul and Elder (2007; 2008b) define critical thinking as “that mode of thinking – about any subject, content, or problem – in which the thinker improves the quality of his or her thinking by skillfully analyzing, assessing, and reconstructing it. Critical thinking is self-directed, self-disciplined, self-monitored, and self-corrective thinking.” Critical thinking is the process of analyzing and assessing thinking for the purpose of improving it. According to Paul and Elder, the improvement of thought is the creative stage of critical thinking.

Two definitions with roots in cognitive psychology are: “the mental processes, strategies, and representations people use to solve problems, make decisions, and learn new concepts” (Sternberg, 1986); “the use of those cognitive skills or strategies that increase the probability of a desirable outcome” (Halpern, 1998). Bailin (2002), who favors a philosophical view, cautions that individuals can utilize cognitive strategies without engaging in actual critical thought.

Some educators define critical thinking through the context of Bloom’s Taxonomy (1956) or Revised Bloom’s Taxonomy (Anderson et al., 2001). The three top levels (analysis, synthesis, and evaluation or identified in the Revised Taxonomy as analyze, evaluate, and create) are often referred to as the levels that represent critical thinking.

Paul and Elder (2007; 2008b)
A research project was conducted involving 46 experts in thinking which resulted in the Delphi Report. Critical thinking was described as a “purposeful thinking process.” During this process, judgments are formed about what to believe or what actions to take in a given context. The actions focus on the use of cognitive skills including “analysis, interpretation, inference, explanation, evaluation, and self-regulation” (Facione, 1990).

Often the literature associates critical thinking with problem solving, giving it a more functional pedagogical usage. Ennis (1991) indicates that critical thinking in general “… means reasonable, reflective thinking that is focused on deciding what to believe or do.” Furthermore, Ennis identifies specific dispositions and abilities that describe the critical thinker. These dispositions and abilities seem to link critical thinking to a reasonable decision-making process.

There may not be one definition that satisfies all parties, but there does appear to be consensus among many who write about critical thinking that the definition include behaviors/skills and actions. For example, critical thinking behaviors or skills include analysis, interpretation, and evaluation. A critical thinker performs several actions including the following: asks questions that advance understanding, is fair-minded and flexible, considers multiple perspectives, seeks and values input of others, suspends judgment while considering all sides of issues, evaluates relevant information using criteria, adjusts assumptions in view of new evidence, draws conclusions thoughtfully rather than hastily.
Need for Critical Thinking

The American Management Association (2010) affirms the need for employees to demonstrate high levels of critical thinking and problem-solving skills. While it is important that individuals collaborate as they seek solutions to key issues, it is imperative in the business world that people also be able to think critically on their own. In a Thinking Skills and Creativity article, Stapleton (2011) indicated that critical thinking appears to be needed in education systems around the world. The information does not appear to target a specific country or area where students lack critical thinking skills. Stapleton also shared a study about 72 high school teachers in Hong Kong. Findings showed teachers in agreement about including critical thinking as a skill, but felt more direction was needed on how to teach critical thinking as well as how to define critical thinking.

Critical thinking is a topic that has been talked about off and on for years. With the recent focus on accountability for standards, critical thinking has gained momentum. There seems to be a movement that schools emphasize critical thinking as a non-negotiable element in instruction. The need has always been present, but it seems that critical thinking in the classroom is now receiving widespread attention. Obviously, educators recognize that all individuals think. What has not been previously understood is that the concern has been in the thinking itself.

Thinking can take many forms and educators and students need to understand that. Sometimes, when individuals share their thoughts the thinking within can be biased, prejudiced, or distorted. Just because people publicize their thinking, it does not guarantee they are informed or that a source is credible. Paul and Elder (2008) advocate that educators have a responsibility to purposefully engage students in thinking to produce quality in thought. A rich intellectual environment must be established to develop or cultivate thinking in schools.

Educators must accept that they do not know what students will need to know in years to come. We must acknowledge that students be skillful thinkers, because every action we take is determined by the quality of thinking. If we want students to reach reasonable solutions and make decisions that solve unknown problems that will be encountered in the future, then addressing critical thinking in today’s classroom is crucial.
Standards and Critical Thinking

Critical thinking has long been touted as a necessary, rather than an optional skill. This essential skill is emphasized as one that prepares students for college and for careers. Today, critical thinking is embedded into the standards in and across all disciplines. The standards describe what students should know and be able to do. It is important that teachers be given the opportunity and time to analyze each standard and identify the essential concept and skills. When teachers have identified this information, they are able to effectively plan, prepare, and focus instruction around those specific elements of knowledge and skill.

Cognitive strategies are those strategies students use to process information and apply the content in meaningful ways. Most standards require the use of cognitive skills in order to meet standard mastery. As teachers unpack standards or clarify standards to determine meaning, key words and phrases that describe mental processes or habits of thinking must be identified (e.g., comprehend, evaluate, analyze, reason, construct, critique). These key terms provide evidence that students must learn to think critically about content and move beyond rote responses. A study of the standards provides ample support that critical thinking skills are essential in K-12 education.
Rigor

A rigorous learning environment is one in which students are expected to demonstrate and are supported as they demonstrate high levels of achievement. Rigor is defined in many ways. In critical thinking, rigor can be described as thinking in depth about a topic (Bogess, 2007; Wagner, 2008). According to Strong, Silver, & Perrini (2001) and Washor & Mojkowki (2006; 2007), teachers plan for rigor when they design lessons that portray real-world situations.

Blackburn (2008) affirms that rigor extends beyond the mere content of the lesson to include the expectations of students. Blackburn advocates that rigor is established through a culture of high expectations coupled with the scaffolded support. This support enables students to not only learn at high levels, but to demonstrate high levels of learning. A rigorous classroom environment is created when two factors are present: high expectations and student support. The degree of support given is contingent upon what students need in order to reach success as they learn to think critically. Blackburn further notes when students believe they can be successful, they become interested in and value learning. This belief grows out of an environment conducive to learning. To lead students to think beyond surface level knowledge, teachers must guide students to dig deeper into topics, issues, or concepts that have relevance to their world. To achieve this, students must be motivated to learn and think, know that teachers believe they can learn to think deeply, and are part of a classroom culture where all students value the thinking of others.
Implementation of Critical Thinking

Critical thinking skills are essential in K–12 education and applicable in college, career, and in life. Teachers can use cognitive strategies to address 21st-century thinking and reasoning skills that specifically address the standards and transfer them into meaningful, relevant content-area instruction. The relevance of the content help students know the value of what is being taught. Thinking with depth, extending ideas, reasoning with logic, justifying claims, and thinking divergently are among the many strategies students must be able to use.

Having students engage in daily critical thinking learning experiences is necessary to ensure that students develop and grow in critical thinking. Teaching in the 21st century can be difficult because of the stimulation received from television and other electronic devices. The intensity of technology sometimes causes students to perceive school as a boring experience. Teachers must overcome this challenge by making the content relevant to the world in which students live. When students can employ critical thinking skills to form connections to their everyday lives, they become engaged in relevant learning.

In the education realm, several models are available for structuring learning experiences, assessments, and tasks that relate to critical thinking. Benjamin Bloom (1956) and his colleagues developed a taxonomy for cognitive process skills. The original taxonomy is one of the most widely used frameworks for teaching, assessing, and understanding levels and types of thinking. Lorin Anderson, a former student of Bloom’s, and David Krathwohl, who worked with Bloom on the development of the original taxonomy, led a group of individuals to revisit and revise Bloom’s Taxonomy. Published in 2003, the Revised Bloom’s Taxonomy (RBT) appears to be more practical in designing instruction and assessment. The names of the levels were changed from nouns to verbs to represent that thinking is an active process. The fifth and sixth levels in the original taxonomy changed places in the RBT. Both taxonomies feature cognitive processes, whereas the RBT includes a second dimension titled Knowledge Dimension. This addition defines the types of knowledge or what is taught.

Thinking with depth, extending ideas, reasoning with logic, justifying claims, and thinking divergently are among the many strategies students must be able to use.
Implementation of Critical Thinking (continued)

Educating students to become critical thinkers combines the development of skills with the nurturing of habits of the mind. The 12 dispositions and 16 abilities, identified by Ennis (1991) describe a critical thinker, and could serve as a guide to educators as they seek to implement a critical-thinking curriculum. Background knowledge also appears to be important for students if they are to demonstrate the skills in critical thinking. Most researchers agree that prior knowledge plays a role in the ability of students to think critically (Case, 2005; Willingham, 2007).

Critical thinking instruction will create an academic framework that students will use throughout their lives. Developing students who can think critically to solve society’s problems is a must. However, educators must be cognizant of a declaration made by Bailin (2002); it is possible for students go through “the motions of thinking” without actually engaging in critical thought. Asking higher-order questions does not guarantee that critical thinking occurs just because teachers ask higher-order questions, the questions alone do not guarantee that critical thinking occurs.

Marin and Halpern (2011) concluded that that 178 high school students who attended low-income Southern California schools demonstrated greater gains in critical thinking when they received explicit instruction as compared to embedded instruction. Embedded instruction refers to an approach where students are guided to think critically about specific course content. In the explicit or direct instruction approach, students were taught specific critical thinking skills, followed with a variety of practice experiences that led to application opportunities. Many studies about the teaching of critical thinking are categorized as the General approach (focus on teaching general critical thinking skills apart from the subject matter) or as the Infusion approach (teaching general critical-thinking skills embedded in subject matter). Other findings are available in the literature that provide insight on different approaches to use in the implementation of critical thinking.

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For example, Ennis (1989) described four approaches for critical thinking instruction.

1. **Direct and explicit instruction** for teaching critical thinking as an isolated course. Problems students will probably encounter in day-to-day life become the content, and critical thinking skills and abilities are emphasized within the context that extends beyond content-specific subjects. Support for this approach is offered by Van Gelder (2005) who stresses that students need focused practice applying critical thinking skills.

2. **The infusion method** provides in-depth, content-specific instruction plus explicit critical thinking instruction. Silva (2008) is an advocate for this approach, noting that knowledge and thinking have to be taught at the same time.

3. **The immersion approach** engages students in content-specific instruction, but critical thinking skills are not explicitly taught. Students acquire the critical thinking skills in the study of the subject matter through the use of ideas. Students are involved in dialogue where they are prompted to consider, analyze, reason, and evaluate various points of view.

4. **A combination** of elements from the general and the content-specific approaches form the fourth method, a mixed approach. Direct instruction of critical thinking skills plus the integration of critical thinking within the context of content-specific instruction occur. Research findings (Abrami et al., 2008) revealed this mixed approach yielded the most positive effect. This finding indicates educators should probably consider integrating critical thinking in academic subjects in addition to teaching critical thinking skills explicitly.

Educators must carefully consider and weigh each approach to critical thinking skills instruction in order to determine which works best for the school, the teachers, and the students in light of literature reviews and research findings. Decision-making is a cognitive process where the outcome is a choice between alternative approaches or an innovatively designed approach using a mix of new and existing methods. Because people often have different preferences, they must be careful to remove biases or prejudices before making decisions about the preferred approach to implementing critical thinking in their schools. Using research evidence, considering the valid opinions of experts in the field, gathering additional information, and examining implications and consequences will help educators make informed decisions. As school leaders think critically, using open minds to collaborate and consider the multiple viewpoints, a viable decision can be made about what critical thinking approach as well as what types of assessment have relevance for developing students as critical thinkers.

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Implementation of Critical Thinking (continued)

Time

Just as instructional time is important to the performance success of students in any subject, it is no different with critical thinking. Thinking critically is a life-long process. Acquisition of critical thinking competencies continue throughout life. It is a journey where individuals should continuously strive to improve the quality of their thinking or reasoning abilities. Time must be purposefully infused into daily instruction for the development of critical thinking. Learning to think critically does not happen all at once, nor do critical thinking skills automatically appear. These skills develop over time with encouragement and guidance. When students are asked questions that require critical thought, time must be allowed for students to process thinking in order to prepare a response. All people are subject to mistakes and each time decision-making opportunities arise, opportunities for undisciplined thought can occur. If educators begin developing students as critical thinkers at a young age and continue the development throughout their education years, then perhaps individuals will learn to demonstrate, more times than not, skillful thought in any given situation.

Teachers must also be allotted time for planning, collaborating, and networking with colleagues. During this time, teachers should discuss and share pedagogical knowledge of critical thinking. Opportunities that support teachers as they co-plan and learn from each other are invaluable professional development opportunities. Teacher collaboration can lead to clarity in what critical thinking looks like, what actions are expected from students, and what changes in teaching practices may need to take place. Professional learning is integral to the success of infusing critical thinking into the curriculum and developing students as critical thinkers.

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Implementation of Critical Thinking (continued)

Monitor the Implementation

An old management adage, “You can expect what you inspect,” appears to apply to monitoring of thinking skills. If the implementation of critical thinking is only given lip service, without regard to an implementation plan, follow-up, sufficient resources, or ongoing support, then students and teachers may cease to develop or improve in critical thinking.

Educational administrators must monitor the implementation of critical thinking practices and offer timely feedback in relation to previously set expectations. Teachers need to know they are supported as they prepare to include, improve, and/or integrate critical thinking into curriculum and instruction. They must also receive encouragement and suggestions as they implement instruction and plan assessments that incorporate critical thinking.

Modeling what is expected helps teachers know the importance extends beyond the school improvement plan document and applies the professional learning with relevance to the school setting. Modeling critical thinking strategies during conversations with faculty members helps teachers engage in meaningful learning experiences that can transfer into daily instructional practices. Reflective thinking allows teachers opportunities to think about the thinking strategies they are using, determine what needs improvement, and consider what might be addressed differently in order to move students forward in becoming successful critical thinkers.

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Instructional Strategies and Techniques

With each passing year the world becomes more complex, so developing critical thinking skills in the 21st century is crucial. The questions that often puzzle educators are: When? How? Beginning in the early years, teachers can impact critical thinking. Teachers must collaborate with other educators to learn how to implement critical thinking and share strategies that appear to produce gains or improve critical thinking. A range of literature is available that focuses on critical thinking and the use of specific instructional strategies thought to encourage the development of critical thinking skills and abilities. Some of the instructional strategies recommended include the following:

- Use explicit instruction in order to introduce students to critical thinking and then engage students in practice thinking opportunities to build critical thinking concepts.
- Involve students in small collaborative or cooperative learning opportunities to emphasize the importance of social interactions. Invite students to participate in Think-Pair-Share, Inside-Outside Circle, Gallery Walks, Write-Pair-Share, and Jigsaw.
- Demonstrate the importance of relationships with others in order for students to learn how to respond with an open mind and value the ideas or contributions of others. Engage students in practice opportunities using Roundtable Discussions, Socratic Circles, Turn to Your Partner and..., Buzz Groups, and Critical Debates.
- Use the Think-Aloud strategy to demonstrate to students how to think critically by making reasoning visible.
- Model critical thinking skills to enable students to observe the use of evidence to support solutions or choices, to illustrate conflict and how to remain fair and flexible, and to point out the need to raise questions about sources/information or to seek additional information.
- Demonstrate the use of organizers that promote critical thinking (e.g., concept maps, summaries of arguments, concrete or abstract concept illustrations).

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Implementation of Critical Thinking (continued)

- Use exit slips (e.g., to note the most important thing learned and how it improves the everyday world, to identify areas of learning that present confusion).
- Have students think while they are reading a text and form a critical analysis about the text. Extend the analysis to include two or more different texts or different types of sources. Summarize the texts and follow with an evaluative interpretation.
- Frame, analyze, and synthesize information in order to solve problems.
- Use Socratic Conversations to clarify meaning and gain a deeper understanding of complex ideas within a text.
- Design questions that promote rigor in thought processes. Formulate questions that promote deep thinking about evidence: How do you know what you know? Point of view: Whose perspective does this represent? Connections: How is ___ related to ___? Assumption: How might things have been otherwise? Relevance: Why is this important? What meaning does it have in today’s world?.
- Have students respond to What If and If Then statements to practice evaluating alternate possibilities and consequences.
- Scaffold the advance to independency method in thinking critically. Begin with modeling, move to small group tasks, follow with partner work, then gradually remove support and provide independent tasks.
- Encourage students to question what they see, read, and hear in order to improve learning not merely for the sake of argument (e.g., Can I elaborate and explain this concept? Can I give an example of ___ in order to connect the learning to my life?).
- Identify and ask significant questions that clarify various points of view and lead to better solutions.
- Have students explain the main points of discussion from the perspective of another or pretend to be the author and explain.
- Present real-world problems or relevant tasks in simulated settings where students engage in interactions in order to make judgments and formulate solutions.
- Relate specific content to issues and problems and practical situations in the life.

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- Lead students to make predictions and to organize their thoughts and ideas to support value judgments. Provide opportunities where students think about their thinking. Ask questions such as: What is a reasonable conclusion or solution? Test it against relevant criteria. What are the connections between ___ and ___? What makes you think that? Is your evidence credible? Am I separating what I understand from what I do not understand? What is your opinion on what you read? What questions do you now have that you did not have before you read this article/text?
- Cultivate a use of metacognitive strategies and activities to help students think about their own thinking and guide them toward developing habits of mind in order to develop as better learners and evaluators. Encourage students to ask questions of themselves: Am I well informed? Do I understand the content? Have I effectively planned how to evaluate the content/task? Is anything missing? What action do I need to take to improve myself? What are other ways I could arrive at a better conclusion? How can I better evaluate the accuracy of the information? Do I accurately interpret information? Do I consider the outcomes of my actions? How might the consequences affect others? Am I willing to accept the ideas of others? What causes me difficulty when I think about solutions/make decisions? What might I do to perform better? What are my strengths/weaknesses? How do I use this information to be a better student? What strategies might I use to improve myself as a developing critical thinker?
- Capitalize on formative assessment during instruction as a way to gauge cognitive processes of students and as a means for students to demonstrate their learning.
Assessment of Critical Thinking

Assessment has one purpose in instruction: improvement. In critical thinking, the goal is to improve the traits, skills, and abilities of students to think critically about the content or issues at hand, using sound reasoning. Teachers need to gather evidence that shows students are thinking critically. The more detailed the curriculum is regarding student expectations about critical thinking, the better teachers are able to design assessments, items, and tasks that generate evidence.

During instruction, formative assessment should be regularly used to provide feedback to teachers and students. Popham (2008) coined a definition for formative assessment as “a planned process in which teachers or students use assessment-based evidence to adjust what they are currently doing.” Such assessment opportunities enable teachers to make timely adjustments to instructional delivery and thus, lead to improved student success. The active feedback provides the next steps to take to move learning or critical thinking forward (Black & Wiliam, 2004; Shavelson, 2006). Formative assessment is important to critical thinking instruction. Students receive feedback regarding their progress toward thinking critically, and teachers are provided information with which to make informed decisions about what to do to improve students’ cognitive processes.

The shift in assessments has now moved from the ability of students to recall information to the ability of students to locate and use that information. Students are demonstrating critical thinking, authentic problem solving, analytic reasoning, and communication skills. In some classrooms, students may be asked to read, listen, speak, write, and/or perform to demonstrate depth and complexity in thinking.

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Assessment of Critical Thinking (continued)

When only selected-response assessment items are used, teachers are not able to adequately measure the thinking involved as they only see if the response is accurate. When students have to provide explanations as why the chosen response is accurate, why other responses are incorrect or how they could be changed to be correct, then teachers can observe the thought and thoroughness behind the responses given by students. In other words, teachers must encourage students to make their reasoning visible through words, illustrations, examples or non-examples. The rationale or justification offered by students identifies the students who reason effectively and to what extent as well as provides evidence of misunderstandings, revealing progress or nonprogress made in students’ critical thinking.

Many cognitive skills are better assessed through open-ended or performance tasks that present real-world issues or authentic situations. Such assessment tasks or items require students to move beyond the recall or reproduction of learning levels. Assessment items, problems, or tasks go beyond a single answer or solution. In other words, there are multiple possible, or defensible, answers or views. Students have ample opportunities to consider multiple perspectives or viewpoints of sources or ideas as they apply problem-solving skills. Students have to think through the task or problem in order to arrive at a solution. The solution should be supported by evidence, reasoning, or justification that supports or defends the choices or claims that the students make. For these types of assessments, rubrics, scales, or checklists are often used. These assessment tools complement both cognitive and metacognitive processes. Students have the criteria with which to design and determine when the task is complete. These types of assessment tools assist in leading students toward becoming thinkers as Paul and Elder (2007) suggested – self-directed, self-monitored, self-disciplined, and self-corrective thinkers. These tools also yield information about the students who can read and write critically and at what level they can perform.

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Assessment of Critical Thinking (continued)

Overall, data derived from assessments help teachers foster critical thinkers. Students cannot become skillful thinkers and perform at high levels unless they know the skills, abilities, traits, and concepts that encompass critical thinking. Assessment data provide evidence of whether students can think critically and to what extent students understand critical thinking. Administrators, teachers, and students are responsible for providing evidence that a thinking-centered environment exists. The development of critical thinking is a shared responsibility.
Summary

Successful implementation of quality instruction in the 21st century will always involve critical thinking. Developing students as critical thinkers is an essential goal. In the cultivation of a critical thinking learning environment, an administrator’s role is to remove all barriers to success. The administrator must be an advocate for the integration of critical thinking into curriculum and instruction. Understanding the need for critical thinking in all grades and increasing higher levels of thought within and across all disciplines are crucial. School administrators must take the opportunity to initiate professional learning experiences and support collaborative discussions regarding the rationale for rigorous thinking in the education of students.

For students to become critical thinkers, teachers must purposefully teach thinking skills and integrate critical thinking within daily learning experiences, support students as they develop these skills, assess for critical thinking, and require successful demonstration of thinking at high levels. Instruction in both the cognitive and metacognitive strategies impacts success in critical thinking. One of the most essential factors for advancing individual performance is the ability of students to apply critical thinking skills. Without consistent and repeated practice opportunities that involve real-world applications, students may fall short of achieving proficiency in critical thinking. Administrators can observe elements of thinking-centered classrooms, monitor evidence of critical thinking in walk-throughs, and engage in purposeful conversations with teachers relative to how critical thinking and rigor improve student success in learning. Students must demonstrate the ability to think independently and critically if they are to be prepared to successfully enter college and careers.
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