Strategic Plan | Vision 2020, Wake County Public Schools
Literature Review for Measuring Metrics

Cross-cutting Skills

Rationale of WCPSS Metrics and Review of Literature

Cross-cutting skills are essential skills for students to lead a productive future life in varying professions. Researchers (e.g., Carneiro, Crawford, & Goodman, 2007; Lindqvist & Vestman, 2011) agree on the positive influence of cross-cutting skills on individuals' education attainment, occupation, and earnings, etc. Yet there is no agreed definition on what constitutes cross-cutting skills. In some studies (Jacob, 2002; Murnane, Willett, Braatz, & Duhaldeborde, 2001), some cross-cutting skills are seen as non-cognitive factors mixed with personality traits; in other studies (Lleras, 2008) social skills and behavioral patterns are equivalent. Another complication is that cognitive abilities such as problem-solving, critical thinking, and creativity could also be categorized as part of cross-cutting skills. In spite of these complications, WCPSS prioritizes critical thinking, problem solving, effective communication, collaboration, proficiency in using technology, grit/perseverance when confronting obstacles, and attendance. The following review highlights literature in these areas.

Critical thinking and problem solving have been promoted by educators in the United States as fundamental goals of schooling, among other goals such as citizenship and emotional health (Snyder & Snyder, 2008). As the quantity of information grows exponentially, the capability to use higher thinking skills enables individuals to analyze large amounts of information effectively to solve problems. Critical thinking and problem solving are essential skills for students to lead successful careers in an information age (Hopson, Simms, & Knezek, 2001). A survey conducted by the Association of American Colleges and Universities (AACU, 2013) showed that more than 90% of employers expect their job candidates to be able to think critically, solve problems, and communicate clearly. In addition to employers' expectations, Butler et al.'s (2012) three studies based on data collected from the U.S., Ireland, Spain, and Portugal revealed that critical-thinking skills strongly predicted real world outcomes. By real world outcomes Butler et al. meant participants' behaviors "in education, health, finance, and interpersonal relationships, etc."(pp. 112-15).

While critical thinking and problem-solving skills are indispensable, individuals also need to **collaborate well and communicate clearly**. The social nature of many occupations requires teamwork in which communication and collaboration are core aspects. In health care, effective communication could reduce the likelihood of healthcare providers causing patient harm (Leonard, Graham, & Bonacum, 2004). For innovative projects, Hoegl and Gemuenden's study (2001) showed that the quality of teamwork was highly associated with team performance.

Moreover, communication and collaboration may foster critical thinking and problem-solving skills (Allen, Berkowitz, Hunt, & Louden, 1999; Powers & Jones-Walker, 2005). Because of the importance of teamwork and communication employers value job candidates' abilities to collaborate with others and communicate clearly (AACU, 2013).

Effective technology use can enhance teaching and learning in a number of ways. In teaching, some researchers argue that technology use was revolutionary for pedagogy (Salaberry, 2001) because technology can make teaching more interesting and productive (Shyamlee, & Phil, 2012). Integration of technology allows teachers to engage students through digital storytelling (Sadik, 2008); integration of technology also allows teachers to illustrate concepts with images and videos, and scenario-based e-learning tools that provide opportunities for students to work with simulations (Siddiqui, Khan, & Akhtar, 2008). Technology has been shown to be effective in promoting student learning. Li and Ma's (2010) meta-analysis of 46 studies found that computer technology had a significantly positive impact on students' mathematics achievement.

Grit, defined as perseverance and passion for long-term goals, is a factor significantly related to student learning outcomes (Duckworth, Peterson, Matthews, & Kelly, 2007; Dymnicki, Sambolt, & Kidron, 2013; Farrington et al., 2012). Farrington et al.'s (2012) comprehensive review of noncognitive factors that shape school performance suggested that "strong academic behaviors and academic perseverance are the noncognitive outcomes that teachers want to achieve in developing their students as learners" (p. 73). Beyond academic perseverance, Duckworth et al.'s (2007) studies concluded that grittier individuals obtained higher levels of education, performed better in college, and had higher summer retention rate.

Attendance matters in student learning (Gershenson, 2016; Lamdin, 1996). Studies based on data collected in Maryland (Lamdin, 1996), Ohio (Roby, 2004), and New York (Durán-Narucki, 2008) have shown that attendance is positively associated with student achievement. While skipping one or two school days in one academic year might not negatively impact student learning, too many absences could undermine the time allocated for learning. Coursework and classes are generally planned as a sequence, too many absences could obstruct a student's ability to catch up.

How Does WCPSS Measure Cross-cutting Skills?

In alignment with the above literature, WCPSS' measure (see Table 1) of cross-cutting skills reports the percentage of students who demonstrate proficiency in critical thinking, problem solving, and communication skills, and the percentage of students who are good collaborators and communicators. The measure also shows how effectively students use technology. Moreover, the perseverance aspect of the measure indicates the percentage of students who agree with two statements: "Setbacks (delays and obstacles) do not discourage me. I bounce

back from disappointments faster than most people." Teachers have also been asked to rate their agreement with a statement that their students' follow through when they encounter challenges. In addition, as a proxy for disciplinary behavior, WCPSS records the percent of students who have no more than five absences for each academic year.

Table 1. WCPSS Cross-cutting Skills Measure

Indicator	**Description**
Critical Thinking and Problem Solving	Percentage of students demonstrating proficiency in critical thinking, problem solving and communication skills
Collaboration and Communication	Percentage of students who are good collaborators
	Percentage of students who are good communicators
Effective Technology Use	Percentage of students who use technology effectively
Perseverance	Percentage of *students* reporting perseverance
	Percentage of *teachers* reporting students have perseverance
Attendance	Percentage of students with fewer than 5 absences for the year

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