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## **Beyond Borders: Hallmarks of Effective K-12 Teaching Online**

April D. Lawrence

*William & Mary School of Education, [adlawrence@wm.edu](mailto:adlawrence@wm.edu)*

Judith B. Harris

*College of William and Mary, [judi.harris@wm.edu](mailto:judi.harris@wm.edu)*

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# International Beliefs and Practices That Characterize Teacher Effectiveness

Leslie W. Grant

*School of Education, William & Mary, USA*

James H. Stronge

*School of Education, William & Mary, USA*

Xianxuan Xu

*Virginia Department of Education, USA*

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*Ke Huang, School of Education, William & Mary, USA*

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# Chapter 11

## Beyond Borders: Hallmarks of Effective K–12 Teaching Online

**April D. Lawrence**

*School of Education, William & Mary, USA*

**Judith B. Harris**

*School of Education, William & Mary, USA*

### **ABSTRACT**

*This synthesis of relevant research and practice publications examines, explains, and illustrates the fivefold hallmarks of effective online teaching in K-12 learning contexts. These attributes of online K-12 teaching excellence include technologically-informed pedagogical content knowledge, or TP(A)CK; student-focused, curriculum-based, contextually-sensitive pedagogical practice; awareness and astute implementation of current online teaching standards; and demonstrated teacher presence, caring, and engagement online. All of these aspects of effective online teaching combine to catalyze and support engaged, communal, and digitally responsible student learning online. The authors acknowledge that the empirical literature base for effective online teaching in K-12 learning contexts, while growing, is still sparse, with considerably more research having been completed and reported to date in higher education.*

### **BACKGROUND: K-12 TEACHING ONLINE**

Although schools are entering the third decade of online learning in primary and secondary education, and the fourth decade of blended learning in K-12 classrooms<sup>1</sup>, research investigating the effectiveness of pre-college online teaching remains

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sparse. Most of the existing literature about online teaching pertains to tertiary education (Martin et al., 2020). However, research about K-12 online teaching is now burgeoning and is beginning to reveal some effective practices of elementary- and secondary-level online teachers. In this chapter, we provide information about the rise of online teaching in K-12 education, describe teacher knowledge, including the specialized knowledge needed for effective online teaching, overview the 2019 U.S. National Standards for Quality Online Teaching, and synthesize the promising practices of effective online K-12 teaching by describing *caring teacher presence*.

First, however, we acknowledge how the global COVID-19 pandemic has impacted K-12 education, and especially our perceptions of online instruction. When COVID-19 was declared a global pandemic in March 2020, many schools and universities across the globe began a rapid pivot to remote instruction. While the transition to remote instruction ensured instructional continuity for many students, it also shined a light on existing educational inequalities. As much of the world shifted to online remote learning, concerns related to issues of equity and access were raised, suggesting that educational organizations with existing infrastructure for supporting online instruction would fare better than those without already-established foundations for online learning programs (World Bank Group, 2020). Indeed, a survey of U.S. school principals by the RAND Corporation found that school leaders who had already undertaken one or more actions toward preparedness prior to the pandemic—for example, providing networked devices for students, offering professional learning for teachers in online teaching, utilizing a learning management system (LMS) broadly, providing online or blended courses, or establishing plans for school closures—were less likely to be challenged with instructional and equity issues than schools that were not similarly prepared (Diliberti et al., 2020). Thus, schools, districts, and universities that had already invested in infrastructure and training for online learning were more prepared for remote learning in response to COVID-19, while others that had little prior experience or existing infrastructure supporting online learning faced daunting challenges.

With these events in mind, we differentiate between *online teaching*, which is planned and deliberate, and *emergency remote teaching* (ERT), which is a response to a crisis. The rapid pivot that occurred as COVID-19 spread internationally was to exigent remote teaching: a temporary replacement for traditional onsite instruction in response to a global crisis (Hodges et al., 2020). In our discussion of online teaching throughout this chapter, we refer instead to that which is planned, deliberate, and chosen, rather than to the necessary emergency remote teaching that occurred in response to the COVID-19 pandemic.

Fully online teaching and learning has existed in K-12 education in several countries since the early 1990's, when the Internet changed the landscape of distance education. At that time, what had previously been known as correspondence



courses, in which students received instruction by way of course content delivered by mail, radio, television, or CD-ROM, transitioned to online or virtual instruction (Barbour, 2018), whereby students could interact with both course content and an instructor. About a decade earlier (in the 1980's), what is now called *blended or hybrid learning* began to be used in elementary and secondary classrooms. At that time, students and teachers began collaborating nationally and internationally in teacher-designed learning projects using text-based electronic mail and online discussion boards, mostly via low-cost educational networks such as FrEdMail, or “free educational mail” (Harkins, 1988; <http://www.globalschoolnet.org/gsnabout/history/>). Blended learning integrates teacher-selected aspects of online learning into classroom-based instruction. It has a somewhat separate literature base and has been shown in multiple studies to be marginally more effective than fully online learning (e.g., Means et al., 2010). In this chapter, however, we address evidence and practice for fully online learning in elementary and secondary education only, given its recent and rapid increase in use.

Since its emergence, most K-12 schools engaged in online learning have used this mode to provide supplemental courses and curriculum primarily for public school secondary students, although some private and full-time virtual schools do exist, especially in the United States (Barbour, 2018; Schwirzke et al., 2018). Typically, students participate in an online course that is not offered in their community's school, such as a world language or an advanced STEM (science, technology, engineering and/or mathematics) elective course. Online learning has also been leveraged in K-12 education to provide remediation and credit recovery options for students who have failed their first attempt to complete a particular course on-campus. In online credit recovery, course materials and tools are usually accessed online, but teachers and/or course facilitators are onsite in school buildings (Barbour, 2017b).

In online courses that secondary students choose to supplement their on-campus school schedules or available curriculum, both the course and the teacher may be online (Digital Learning Collaborative, 2020). The majority of secondary-level online learning taking place globally, notwithstanding pandemic-related emergency remote teaching, is supplemental (Barbour, 2018). The Virtual High School Global Consortium, for example—one of the earliest organizations providing supplemental online courses to secondary students—had over 18,000 enrollments in more than 33 countries in 2016 (Evergreen Education Group, 2016).

Online learning can take many forms: asynchronous, synchronous, or both; supplemental or full-time; cohort-based or self-paced, to name just a few. In the discussion of online teaching effectiveness that follows, we are focusing on online instruction that is teacher-facilitated, and that tends to be cohort-based—with groups of students working through a course or curriculum within a given period of time—rather than referencing online instruction that may be individualized,

completely self-paced, or teacher-less. Online instruction that does not involve ongoing communication with teachers and other students tends to be the design of credit recovery online courses, often facilitated by onsite rather than online instructors, or students' self-initiated, independent, informal learning online, which is often done with web-based resources offered in multiple formats (e.g., video, audio, imagery), and shared interactively via social media.

In this chapter, therefore, we describe teacher knowledge and practices that contribute to effective fully online teaching for K-12 students. However, as the COVID-19 pandemic has shown us, understanding effective online teaching practices is necessary and potentially helpful to all educators in this digital age, regardless of current teaching modes.

## **EFFECTIVE TEACHING**

As this overview illustrates, online teaching at elementary and secondary levels has occurred for more than three decades and is growing quickly, even notwithstanding moves to emergency remote teaching during the COVID-19 pandemic. Whether or not this teaching has been effective in terms of students' learning, however, is not easy to determine, due to differing definitions of effectiveness, multiple ways of structuring and facilitating students' online learning, and a comparative paucity of research to date that explores specific indicators of effective teaching online.

As can be seen in previous chapters of this book, definitions of teaching effectiveness in any format can differ, both across and within countries and cultures, given their sensitivity to myriad contextual attributes and expectations (Jensen et al., 2019). Conceptions of effectiveness can also change in important ways when teaching occurs online, given unique contextual conditions that characterize different forms of online learning (Pulham et al., 2018) such as time-shifted participation, use of multiple modes and channels for communication, and increased opportunities to personalize learning. However, as will be described later in this chapter, there are several sets of standards for K-12 online teaching that are now converging. Until very recently, these standards have developed somewhat separately from nascent research about effective online teaching (Larson & Archambault, 2019). We will, therefore, summarize standards-determined and research-based ideas about effective online teaching that have emerged to date separately before showing how they relate to each other.

First, though, we will define teaching effectiveness in general. We note that this differs from *teacher effectiveness*, which typically focuses upon teacher characteristics (e.g., professional credentials, years of experience, and beliefs) and summative evaluations that document teacher behavior, sometimes correlating it

with student achievement. Definitions of teaching effectiveness are usually more formative, contextually sensitive, and focused upon practical strategies for pedagogical improvement. This view acknowledges that teaching involves not only what teachers know and do (content and pedagogy), but also their awareness of their own and their students' identities, backgrounds, and dispositions (Jensen et al., 2019).

Teaching effectiveness has been described as “teachers' warmth, rigor, and provision of instructional supports” within well-managed and academically rigorous learning environments, as teachers adapt pedagogical practices to students' needs and learning contexts (Sandilos et al., 2019, p. 11). Such practices are understood to be rooted in teachers' wide-ranging and diverse *knowledge* (Jensen et al., 2019), which is used to direct teachers' *practice*. One of the most influential and widely accepted models of teacher knowledge in educational research—the seven-component *knowledge base for teaching*—was proposed by Lee Shulman in 1987, along with his depiction of how teacher knowledge is operationalized using six recursive and overlapping *pedagogical reasoning and action* processes.

## **Teacher Knowledge**

Shulman's research with secondary teachers formed the basis of his conceptions of teachers' knowledge and practice. Many other researchers have built upon his models in the ensuing decades. They have further explored the nature and uses of teachers' knowledge in multiple K-12 content areas and classrooms, particularly in science education (de Sá Ibraim & Justi, 2019). Shulman (1987) identified seven interconnected components of this knowledge base for teaching, comprising:

- content knowledge,
- curriculum knowledge,
- pedagogical content knowledge,
- general pedagogical knowledge,
- knowledge of learners and their characteristics,
- knowledge of educational contexts,
- and knowledge of educational ends, purposes and values.

Content knowledge is subject matter knowledge that differs by discipline. It is the basis of curriculum knowledge, but the two are distinct. To Shulman, curriculum knowledge is awareness of available programs, learning materials and tools that are used to teach disciplinary content within particular learning contexts.

Pedagogical content knowledge (PCK) is the aspect of Shulman's knowledge base for teaching that has garnered the most attention from educational researchers. It is unique to teachers: “that special amalgam of content and pedagogy that is uniquely

the province of teachers; their own special form of professional understanding” (1987, p. 8), or the knowledge that is used to teach in particular content areas. General pedagogical knowledge guides the acts of teaching themselves; it is classroom management and instructional knowledge that is process-focused and differs by context and students’ developmental levels, but not by content area. Knowledge of learners and their characteristics helps teachers to customize learning experiences for students according to their needs and preferences.

Knowledge of educational contexts helps teachers to situate their professional practice appropriately at multiple levels: classroom, school, district, region, and country; and also according to culture, ethnicity, language, socioeconomics, and other aspects of students’ intersectional identities. Knowledge of educational ends, purposes, and values held by the communities in which teachers work helps to guide teachers’ practice foundationally, so that it reflects and aligns with these more deeply held belief systems (Shulman, 1987).

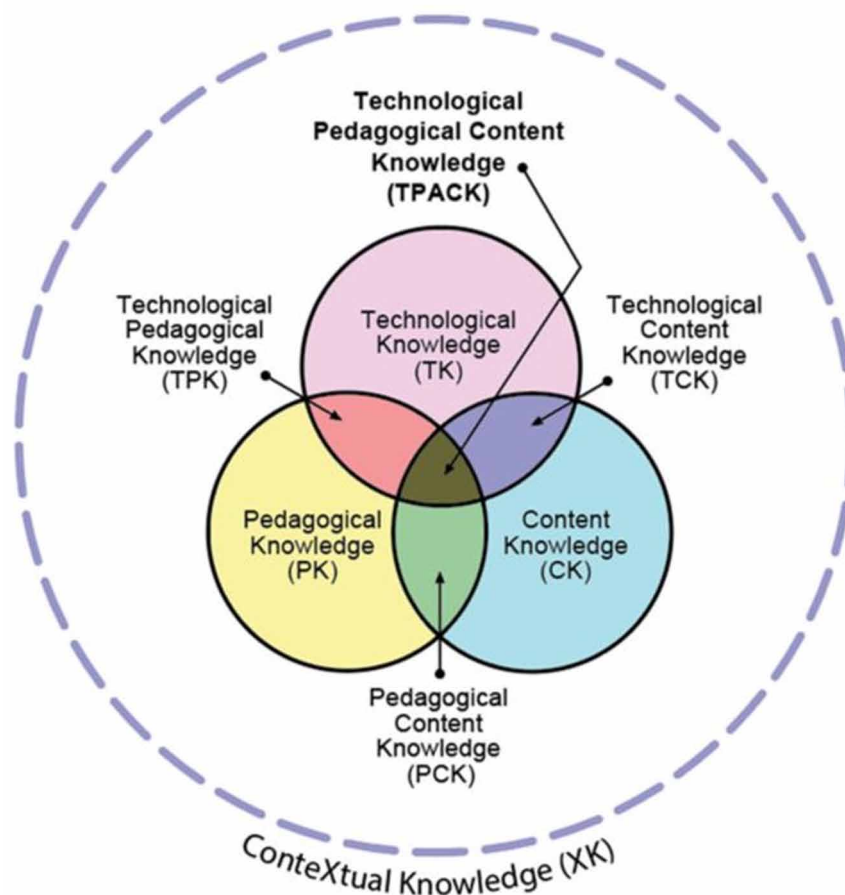
## **TP(A)CK**

Research about teachers’ specialized knowledge for online teaching (as contrasted with onsite teaching) in elementary and secondary learning contexts has focused primarily upon pedagogical content knowledge (PCK) as it is modified to be used within virtual learning environments. Beginning in 2001, PCK was extended by multiple researchers to become *technological pedagogical content knowledge* (TPCK) or *technology, pedagogy, and content knowledge* (TPACK) (Angeli & Valanides, 2005; Keating & Evans, 2001; Koehler et al., 2004; Niess, 2005; Pierson, 2001; Thompson & Mishra, 2007-2008). Voogt et al. (2013) combined these two acronyms to reflect both terms as TP(A)CK.

PCK became TP(A)CK when educational technology researchers added digital technological knowledge (TK) to the knowledge base for teaching. Adding TK modifies teachers’ PCK significantly. It requires new types of teacher knowledge for choosing content-specific digital resources and tools appropriately (termed *technological content knowledge* or TCK), and for facilitating learning with digital tools and resources effectively, known as *technological pedagogical knowledge* or TPK (Mishra & Koehler, 2006). This knowledge is built and applied differently across multiple and varied educational contexts (Porrás-Hernández & Salinas-Amescua, 2013). Taken together, this is the “total package”—or TPACK (Thompson & Mishra, 2007-2008)—of the specialized knowledge that is needed to teach effectively in different content areas with digital tools and resources, including those that support online learning. The most frequently cited model of TP(A)CK appears in Figure 1 in its most recently published form.

*Figure 1. Technology, Pedagogy, and Content Knowledge: TP(A)CK*

Note. From “Considering Contextual Knowledge: The TPACK Diagram Gets an Upgrade,” by P. Mishra, 2019, *Journal of Digital Learning in Teacher Education*, 35(2), p. 77 (<https://doi.org/10.1080/21532974.2019.1588611>). Copyright 2019 by ISTE: <http://iste.org/jdlte>.



## **Pedagogical Reasoning and Action**

Shulman (1987) also proposed six simultaneous, interconnected processes that comprise teachers’ *pedagogical reasoning and action* (PR&A). These processes operationalize the seven components of the knowledge base for teaching. They are typically described as teachers’ planning, decision-making, instruction, and evaluation. Shulman, however, conceptualized these recursive, interdependent processes more specifically, to include teachers’:

- comprehension - of the content to be taught and the purposes for teaching it,

- transformation - of the content to be taught into conceptual models and learning activities, adapted to specific learners' needs and preferences,
- instruction - as the acts of teaching that can be observed,
- evaluation - of both students' learning and teachers' self-evaluation of their teaching,
- reflection - upon all of these teaching and learning processes, ongoing, and
- new comprehension - which is built from reflection upon the other five processes and implemented as the PR&A cycle continues.

New comprehension, according to Shulman, leads to changes in future practice that are based in ongoing and active observation of and reflection upon all aspects of a teacher's pedagogy.

Research about *knowledge* for effective online teaching has focused predominantly upon the nature and pedagogical expression of teachers' TP(A)CK—absent, in many ways, consideration of the other six aspects of Shulman's (1987) knowledge base for teaching. Research that explores online teaching *processes* in elementary and secondary learning contexts (which is far less prevalent than TP(A)CK investigations) has focused primarily upon transformation/selection of learning activities and materials, instructional techniques, and evaluation of students' learning. The specific knowledge types and pedagogical processes thought to be necessary for effective online teaching are delineated in standards for elementary and secondary education.

## **EFFECTIVE ONLINE TEACHING: STANDARDS**

As online learning has grown during the last few decades, standards for quality assurance in online K-12 teaching have emerged. Examining these standards can provide one way to delineate the practices of effective online teaching. The use of standards, however, has varied greatly from country to country. Many, if not most, countries do not use specific standards to inform online teaching. In most, guidelines for online teaching and learning are combined with those that advise onsite use of other educational technologies—known also as information communication technologies (ICTs)—complicating evaluation and quality assurance of online teaching (Barbour, 2018).

South Korea, for example, identified general teacher competencies in ICT literacy and educational use as indicators for effective technology integration practices (Hwang et al., 2010). The Australian Professional Standards for Teachers (<https://www.aitsl.edu.au/teach/standards>) also address ICT use generally within one of seven over-arching standards: “plan for and implement effective teaching and learning.”

## ***Beyond Borders***

In Canada, one jurisdiction out of 13 provinces and territories provides quality indicators for online learning (Barbour, 2018).

In China, online “cyber-schools” are designed to offer at-home learning and testing that supplement pre-college onsite schooling and help to ensure university entry. Like South Korea, China’s national standards, which were approved in 2003, address educational use of ICTs that include, but are not limited to, online tools and resources (Kargiban & Kaffash, 2012). In an attempt to ensure quality, as of July 2019, content and teachers for primary and secondary students enrolled in after-school online learning must be approved by the Chinese government (Schaub et al., 2019).

## **United States Online Teaching Standards**

In the early days of K-12 online learning in the U.S., quality indicators emerged mostly within individual organizations, with providers such as the Virtual High School, the National Education Association, and the Southern Regional Education Board developing standards as guideposts for online teachers and program administrators (Barbour, 2018; Southern Regional Education Board, 2006). In 2008, The Aurora Institute, nonprofit champions of online learning, and formerly iNACOL, the International Association for K-12 Online Learning, developed and widely distributed the first set of national online teaching standards, which were then revised in 2011 according to feedback from educational organizations that were using them (iNACOL, 2011). However, the revised standards were critiqued for not promoting online community building or emphasizing the importance of teacher presence (Jackson, 2017), among other concerns.

In 2019, through a collaboration among the Virtual Learning Leadership Alliance, Quality Matters, representatives from the former iNACOL, and multiple experts in K-12 online teaching, the 2011 iNACOL standards were revised and refreshed (Virtual Learning Leadership Alliance & Quality Matters, 2019), producing the current National Standards for Quality Online Teaching (NSQ). Three categories of revised standards comprise the NSQ, addressing: quality online teaching, quality online courses, and quality online programs. According to the authors, the purpose of the revised standards for online teaching is “to provide the K-12 online and blended learning community with an updated set of openly licensed standards to help evaluate and improve online courses, online teaching and online programs” (2019, p. 5). All three sets of standards are open, accessible, and available to a potentially global audience. Because the focus of our chapter is on effective online teaching, we will focus upon the NSQ standards that pertain to that category.

However, we must first note that there are prerequisites to effective online teaching that pertain less to practice and more to the contexts and infrastructure that make effective online teaching possible. For example, student and teacher access

to broadband Internet and to technologies such as learning management systems or videoconferencing platforms may be necessary for effective online teaching to occur, but the NSQ teaching standards—unlike China’s ICT standards, for example—are not designed to guide technological requirements.

The NSQ standards and associated indicators are intended to provide guidance for K-12 online teaching, courses, and programs, while also permitting enough flexibility to support differing online learning contexts (Virtual Learning Leadership Alliance & Quality Matters, 2019). In their review and explanation of the revision process used to update the 2019 standards, Shattuck and Burch (2018) noted that research related specifically to K-12 contexts, as well as “theoretically informed frameworks” (p. 3) such as TP(A)CK were introduced.

There are eight categories in the current NSQ teaching standards: professional responsibilities, digital pedagogy, community building, learner engagement, digital citizenship, diverse instruction, assessment and measurement, and instructional design. The categories begin with guiding statements, with additional indicators and examples provided for each standard. We have included the standards’ categories and guiding statements in Table 1 as an overview. The complete set of standards can be accessed at <https://www.nsqol.org/>.

*Table 1. Summary: National Standards for Quality Online Teaching*

Standard A	Professional Responsibilities	The online teacher demonstrates professional responsibilities in keeping with the best practices of online instruction.
Standard B	Digital Pedagogy	The online teacher supports learning and facilitates presence (teacher, social, and learner) with digital pedagogy.
Standard C	Community Building	The online teacher facilitates interactions and collaboration to build a supportive online community that fosters active learning.
Standard D	Learner Engagement	The online teacher promotes learner success through interactions with learners and other stakeholders and by facilitating meaningful learner engagement in learning activities.
Standard E	Digital Citizenship	The online teacher models, guides, and encourages legal, ethical, and safe behavior related to technology use
Standard F	Diverse Instruction	The online teacher personalizes instruction based on the learner’s diverse academic, social, and emotional needs.
Standard G	Assessment and Measurement	The online teacher creates and/or implements assessments in online learning environments in ways that ensure the validity and reliability of the instruments and procedures. The teacher measures learner progress through assessments, projects, and assignments that meet standards-based learning goals, and evaluates learner understanding of how these assessments measure achievement of the learning objectives.
Standard H	Instructional Design	The online teacher curates and creates instructional materials, tools, strategies, and resources to engage all learners and ensure achievement of academic goals.

*Note.* Excerpted from Virtual Learning Leadership Alliance & Quality Matters, 2019.



## ***Beyond Borders***

One of the primary changes evident in the refreshed 2019 NSQ standards is the addition of labels to identify the standards' primary themes (i.e. digital pedagogy, community building). Interestingly, Standard H, Instructional Design, is highlighted as an optional standard, recognizing that often K-12 online teachers are expected to teach pre-developed curricula and courses. Similarly, Standard G, Assessment and Measurement, warns that "in courses that are already created, teachers may not be able to create or include additional assessments" (p. 24).

## **Teacher Knowledge and Presence in the NSQ Standards**

Thus, what emerges as key in the revised NSQ teaching standards is online teachers' knowledge and presence, which are mentioned in Standard B: Digital Pedagogy. The standards state that effective online teachers will have the knowledge and skills needed to select appropriate tools, technologies, and instructional strategies that engage learners and promote online community-building. However, what is most emphasized is the online teacher being an active, present facilitator in the virtual classroom. Presence has been widely cited as an integral element of effective online teaching (e.g. Borup et al., 2014a; Dikkers et al., 2013; Garrison et al., 2000), yet this is the first time that it has been named as such in U.S. standards for quality online teaching.

Online teacher presence can be demonstrated, according to Standard B, by using digital tools to "nurture learner relationships, encourage learner interaction, and monitor and motivate learner engagement" (Virtual Learning Leadership Alliance & Quality Matters, 2019, p. 30). We also see presence as necessary to meet several other standards in which it is not explicitly named, such as "C3: The online teacher develops a community among culturally diverse learners by providing opportunities for interaction that are conducive to active learning;" "D3: The online teacher enables a learner-customized pace and/or path through instruction aligned with learners' individual goals, learning trajectories, and interests;" (p. 31), and "F7: The online teacher supports and provides a forum for sharing the varied talents and skills that learners bring to the online environment" (p. 32). Requisite to each of these indicators is the online teacher's presence and responsiveness. Just as we expect onsite classroom teachers to get to know their students, to adjust instruction to meet the needs of those students, and to build positive personal relationships with them, the 2019 NSQ teaching standards recommend the same student-centered levels of caring responsiveness for the online teacher. Thus, in addition to the specialized knowledge a teacher needs to be able to select appropriate technologies and curriculum-based activities and resources to support online instruction, they will ideally also exude a caring, engaged and responsive teacher presence online.

## **EFFECTIVE ONLINE TEACHING: KNOWLEDGE**

Given the specificity and apparent comprehensiveness of current standards for online teaching, it would be easy to assume that all or most are based in empirical research findings. Unfortunately, this is not the case (Barbour, 2019; Larson & Archambault, 2019). Urgent needs for implementable K-12 online teaching guidelines have far outpaced the amount of data-based research available about specific pedagogical knowledge and practices for effective online teaching.

In fact, Barbour (2020) takes even the scant extant research about K-12 online teaching and learning to task in detail, declaring it to be “atheoretical, methodologically questionable, contextually limited, and overgeneralized” at present (Abstract). The comparatively few systematic investigations of K-12 online teaching that are available are mostly small-sample, localized studies of participants’ online teaching experiences and perceptions. While these perspectives are valuable and helpful to consider, especially from a pragmatic standpoint, the results of studies like these are not necessarily generalizable to statements about the nature of effective online teaching overall. Put simply, there is not enough empirical research that has been conducted and published to date about K-12 online teaching to support and justify all of the practices recommended by even the most recently revised standards, despite claims by some authors to the contrary (Barbour, 2019). However, since current standards for effective online teaching are rooted at least in part in research results, and primarily in the practice-based expertise of teachers and teacher educators, we suggest that both research *and* standards should be considered at the present time to inform effective online teaching.

Given the paucity of research regarding effective K-12 online teaching, the recommendations for teachers’ knowledge and teaching strategies that have appeared in educational literature and that we summarize below should, as Barbour (2017b; 2020) cautions, be considered with some skepticism. Acknowledging this proviso, what follows is a synthesis of the admittedly limited research findings about K-12 teachers’ knowledge for and practices in online teaching.

### **Teachers’ Knowledge for Online Teaching**

Knowledge for teaching online at elementary and secondary levels is similar, in many ways, to knowledge for effective teaching in physical classrooms (Pulham et al., 2018). However, the nature of online spaces for interactions between teachers and students, among students, and between students and digital learning tools and materials expands and changes the knowledge required for effective online teaching. Teaching online effectively requires that teachers know how to “(a) convey knowledge with limited face-to-face contact, (b) design and develop course content

in a technology-based environment, (c) deliver content in a way that will engage students, and (d) use assessment measures to assure that students master content” (Archambault & Kennedy, 2018, p. 221).

Stated in terms of TP(A)CK (as described earlier in this chapter), the specific knowledge needed for effective online teaching that has been documented in data-based research is of six types. These knowledge types include technological (TK), content (CK), pedagogical (PK), pedagogical content (PCK), technological content (TCK), and technological pedagogical (TPK) knowledge, all of which together, along with contextual knowledge, comprise teachers’ TP(A)CK (Mishra, 2019; Mishra & Koehler, 2006) for effective online instruction. Moore-Adams et al. (2016) synthesized all of the knowledge and skills that had appeared in publications about K-12 online teaching, most of which were not derived from data-based research. What follows is a summary of only the research-based findings that appeared in this literature review. Please note, however, that the designs and sample sizes of the studies reviewed do not necessarily permit the results to be generalized to all K-12 online teaching.

## Technological, Content, and Pedagogical Knowledge

Required technological knowledge (TK) includes being skilled with basic uses of technology, mastering the technical interfaces in which instruction will be delivered, understanding the technological knowledge that students need to be able to function in an online environment, knowing when and how to develop or locate online resources to meet specific learners’ needs, and continually extending educational technology knowledge (Moore-Adams et al., 2016, p. 338). These types of TK are used primarily during the transformation (specifically, selection and adaptation of materials and approaches to meet students’ learning needs) processes identified by Shulman (1987). Required content knowledge (CK) for effective online teaching includes having extensive knowledge of (comprehension) and appreciation for the target content area, being able to clearly organize and structure content to be shared in an online format (Shulman’s transformation/preparation processes), and continually extending one’s content knowledge (Moore-Adams et al., 2016, p. 338).

Recommended pedagogical knowledge (PK) for K-12 online teaching includes knowing how to develop and facilitate learning activities that are collaborative, highly interactive and motivating, and which encourage students’ active engagement with content. In addition, developing course components that reflect students’ interests, knowing how and when to provide appropriate learning supports, understanding how to balance pacing with pedagogical strategies used, and mastering written online communication with students are important (Moore-Adams et al., 2016, pp. 338-339). This knowledge is implemented in Shulman’s (1987) transformation/selection and /

adaptation processes, which lead, of course, to instructional processes. Finally, using multiple strategies, including alternative assessments, to assess student learning, and using data to self-evaluate pedagogical strategies employed are also key aspects of effective online teaching (Moore-Adams et al., 2016, p. 339; Shulman, 1987).

## Technological Content and Technological Pedagogical Knowledge

The technological content knowledge (TCK) needed for effective online teaching that has been documented empirically includes using content knowledge to assist with technology integration decisions, developing and leading motivating learning activities that encourage students' active engagement with content, and knowing when to seek out or develop additional content-based resources (Moore-Adams et al., 2016, p. 340). This knowledge is applied during transformation/representation, /selection and /adaptation pedagogical reasoning processes (Shulman, 1987).

Research-based technological pedagogical knowledge (TPK) that is necessary for effective online teaching includes: using knowledge of students to assist with technology integration decisions, developing and facilitating motivating learning activities that encourage students' active engagement with content, considering issues of student access to technologies when integrating their use into instruction, understanding how to provide opportunities for students to interact with each other and with the instructor online, and knowing how to facilitate the formation of community online (Moore-Adams et al., 2016, p. 340). Like TCK and TPK, this knowledge is used primarily during transformation/selection and /adaptation processes (Shulman, 1987).

## Teachers' Knowledge in the Standards for Online Teaching

While we have acknowledged that the evolving sets of standards that guide effective online teaching may not yet be empirically validated, we also recognize that there is value in having a set of guideposts that are derived from practice. The 2019 National Standards for Quality Online Teaching (NSQ) have evolved from multiple iterations of standards, and from the collective wisdom of practitioners and leaders in K-12 online learning. Thus, we look to the standards for indicators of specific teacher knowledge that might be expected of practicing online teachers. Two standards in particular require the online teacher to have some specialized digital knowledge. They are Standard B: Digital Pedagogy and Standard E: Digital Citizenship.

## Digital Pedagogy

Standard B presumes teacher knowledge of “digital pedagogical tools,” content area technologies and resources, basic technical troubleshooting, and digital spaces (Virtual Learning Leadership Alliance & Quality Matters 2019, p. 11). These are examples of technological content knowledge (TCK) and technological pedagogical knowledge (TPK). An effective online middle school science teacher, for example, might have specialized knowledge of available web-based scientific demonstrations such as a lunar phase simulation, and of pedagogical tools that support scientific inquiry such as interactive science journals for recording data and images (TCK and transformation/preparation processes). The effective online teacher will also be able to guide students in using these tools during science learning (TPK and instruction processes).

## Digital Citizenship

Standard E presumes teacher knowledge in intellectual property and fair use of published materials, academic integrity, appropriate use of the Internet, and in “experiences that model and promote digital citizenship” (Virtual Learning Leadership Alliance & Quality Matters, 2019, p. 19). Here we see evidence of applied technological (TK) and pedagogical (PK) knowledge, implemented during instructional processes. For example, an online math teacher might model digital citizenship by creating original instructional videos and permitting students to access them within a safe, password-protected learning management system. An online high school English teacher, on the other hand, might demonstrate specialized knowledge of digital citizenship by teaching students to use resources and processes for creating multimedia presentations using open and fairly acquired media that are properly cited in the students’ creations. In the latter scenario, teacher knowledge about the Creative Commons, for example, while somewhat technical, also becomes pedagogical.

After having reviewed these limited research findings about effective K-12 online teaching, we remind ourselves and our readers yet again that “at this stage, the research is still too immature to describe these [knowledge and skills] as best practices or strategies that are tried and true” (Barbour, 2017b, p. 45). However, extant literature does coalesce around several *essential practices* of effective online teaching at elementary and secondary levels: teacher presence, caring, and engagement.

## **EFFECTIVE ONLINE TEACHING: PRACTICES**

As noted earlier in this chapter, a majority of the research that pertains to online teaching effectiveness has occurred at the tertiary or university level, rather than at K-12 levels. Higher education researchers have used metrics such as student satisfaction scores as indicators of learning success (e.g. Dennen et al., 2007; Richardson & Swan, 2003). By contrast, researchers, and especially stakeholders, in K-12 online learning have typically interpreted course completion rates to signal success (Evergreen Education Group, 2016; Freidhoff, 2018). There are fewer studies that measure K-12 students' learning directly to determine degree of success. One of the first larger-scale research studies to do this—commissioned by the U.S. Department of Education—questioned whether online learning was as effective as face-to-face instruction. In a meta-analysis of 45 experiments and quasi-experiments comparing online and face-to-face learning conditions, researchers found that students performed well in both conditions, but that students learning in blended environments performed slightly better (Means et al., 2010). However, of the 45 studies used in the meta-analysis, only five involved K-12 learners, so we cannot be sure whether the study's results apply to K-12 online learning overall.

While reviewing extant research about online learning in higher education, Barbour (2018) recommended that K-12 online learning researchers improve the quality and applicability of their inquiries' results by employing more theoretical or conceptual frameworks (such as TP(A)CK, explained earlier, or the Community of Inquiry framework, referenced below), using more validated instruments, and carefully describing the terms that characterize the learning contexts that are being examined. He suggested that while K-12 online learning researchers and practitioners could borrow what is applicable from research in higher education, they should also be cognizant of aspects that are distinct to K-12 online education (Barbour, 2017a).

Two of the primary differences between online learning in K-12 and higher education contexts are the ages and developmental stages of the students. In addition, unlike higher education, K-12 education is compulsory. As such, a schoolteacher's job is to guide all students toward academic success and achievement, regardless of their abilities, socioeconomic status, or motivation. Thus, the K-12 teacher is expected to provide engaging and equitable learning for all students. Meta analyses have shown that teachers have the greatest impact upon K-12 student success; more so than any other factor (e.g., Hattie, 2009; Stronge, 2018). Both researchers and practitioners point to the power of the teacher-student relationship in encouraging students' achievement. In their review of researched practices that increase K-12 students' opportunities to learn, Boykin and Noguera (2011), for example, found that teacher-student relationship quality (TSRQ) can be a strong predictor of student success. Research about best practices in K-12 online teaching similarly points to

the importance of the online teacher to student success (e.g. Borup et al., 2014a; Dikkers et al., 2013). What does the effective online K-12 teacher do? Research suggests that they exude and actively practice a *caring teacher presence*.

Critics of online learning may suggest that online instruction is cold and impersonal. Indeed, K-12 online learning can be described as such when the learning is not facilitated by an online teacher who is responsive and intentional in fostering relationships with and among students. Thus, many of the characteristics of effective online teaching have less to do with technology than with the human interactions that comprise engaged teaching, whether it occurs face-to-face or online. We suggest that presence, caring, and engagement are key.

## **Presence**

The notion of presence is one of the most widely researched constructs in online learning (Barbour, 2017a). It appears in online teaching standards for the first time, however, in 2019 (NSQ). Presence derives from Garrison et al.'s (2000) proposed Community of Inquiry framework. This framework identifies three necessary presences that support and characterize successful online learning: teacher presence, social presence, and cognitive presence. Teacher presence refers to the teacher's ability and willingness to be fully present in the course through skilled design and frequent and responsive interactions with students. Social presence refers to students' abilities and willingness to engage with one another and to be present in the course themselves. Cognitive presence refers to the nature and sequence of learning activities inherent in the design of the course. Cognitive presence is demonstrated ideally in activities that spark wonder and curiosity to guide learners through collective inquiry. While all three presences are presented as equally contributing to the success of an online educational experience, the importance of teacher presence online seems to be emphasized more often in online learning research.

Online students tend to prefer teachers who are responsive. In several studies, teacher presence in online learning has been linked to increased student satisfaction, positive perceptions of learning and higher rates of course completion (Blaine, 2017; de la Varre et al., 2014; Dikkers et al., 2013; Hawkins et al., 2013). It must be noted, however, that there have been very few large-scale studies that examine effects of K-12 online teaching upon students' academic achievement. Rather, there have been multiple small-scale studies done that document relationships between teacher presence and K-12 students' satisfaction and course completion rates (e.g., Blaine, 2017; Hawkins et al., 2013). At the North Carolina Virtual School in the United States, for example, 91% of students identified instructor involvement as important to their learning (Dikkers et al., 2013). In a study of high attrition rates in a K-12 rural online program, students identified a lack of timely teacher response

as one of their reasons for dropping out (de la Varre et al., 2014). The students expressed frustration with the time it took to receive teachers' responses or feedback on assignments. Thus, online teachers who are responsive and communicative in timely ways may provide a sense of increased teaching presence in their courses (Garrison et al., 2000).

How can these research results help to inform practice directly? The need for answers to this question became urgent in the early months of 2020. In response to the need for emergency remote teaching during the COVID-19 pandemic, the Australian Institute for Teaching and School Leadership (2020), for example, published *What Works in Online/Distance Teaching and Learning* to assist teachers in making the quick pivot to remote instruction. Above all, this document stressed the importance of teacher presence in helping students to succeed in online learning. At nearly the same time, the Johns Hopkins School of Education published a synthesis of research-based best practices in K-12 online learning to help teachers understand how to best transition to online teaching. "Communicate, communicate, communicate!" is one of its seven best practices for online teaching (Reilly, 2020). Effective online learning (and therefore teaching) requires more frequent teacher-to-student and student-to-teacher communication than is necessary within offline learning contexts. There is also some indication that more frequent teacher-to-student interaction may positively influence online learning at secondary levels (Barbour, 2017b). Indeed, active, responsive communication seems to be at the core of creating teacher presence online.

Teachers can demonstrate online teaching presence in multiple ways. Some sample practices in an online class might include:

- Providing quick and substantive feedback on student assignments.
- Reading and replying regularly to students' discussion board posts and emails.
- Reaching out through email or other private online communication (e.g., private text messaging) tools to individual students who fall behind in their work to provide support.
- Posting weekly announcements to remind students of upcoming activities and expectations.
- Using course-based social media to share intermittent thoughts, questions, and resources of interest, encouraging students to do the same.
- Sharing a bit about themselves through text, image, audio, and/or video so that students can see their teachers as people, rather than as merely text replies on a screen.

Effective online teaching is an active pedagogy. The praxis of that pedagogy resides in the teacher's ability to engage in meaningful communication with students throughout the duration of the learning experience.



## **Caring**

Having an ethic of care is widely regarded as a necessary disposition for teachers. Care is especially important in K-12 education, as students are minors in the care of their teachers and school administrators during the school day. Sometimes elementary-level teachers are asked to consider the social-emotional needs of students even before addressing their academic needs, thereby taking a “whole child” approach to teaching. Caring is also deeply rooted in the tenets of culturally responsive pedagogy, with educational scholars citing caring as a necessary precursor to culturally responsive instruction (e.g. Gay, 2004; Ladson-Billings, 1994). This humanistic approach to instruction, rooted in an ethic of care, has, like presence, emerged as a promising practice in K-12 online education.

Drawing from the Community of Inquiry framework, and from Nodding’s (2005) conception of caring (dialogue, confirmation, modeling, and practice), Borup et al. (2013) explained how creating social presence can serve to establish care in the online classroom. Establishing social presence in an online class can help students engage in meaningful dialogue with one another, as well as with their teacher. Valasquez et al. (2013) identified six characteristics of technology-mediated caring in an online high school: continuous dialogue, teacher-student accessibility, promptness, initiating dialogue, shared experience, and vigilant observation. Teachers in the online high school studied reported that using collaborative technologies like shared online documents helped to provide students and teachers with shared experiences. Teachers also noted that observing students working together online helped them to learn about their needs, so that they could respond helpfully and appropriately.

Exhibiting an ethic of care is inherent, although not explicit, in several of the indicators of quality online teaching in the 2019 NSQ standards, including “B3: The online teacher uses different types of tools to interact in online courses in order to nurture learner relationships, encourage learner interaction, and monitor and motivate learner engagement” (p. 11); “C5: The online teacher is able to meet the learning needs of all learners, regardless of cultural background and perspective” (p. 13); and “D4: The online teacher establishes relationships through timely and encouraging communication, using various formats” (p. 16). Thus, care is not only dispositional, but also actionable, in online teaching.

We would also suggest that online teachers demonstrate care when they ensure that course materials are easy to navigate, and instructions for schoolwork are clear from learners’ perspectives. Even when online teachers use pre-packaged course materials, it is important to ensure that their content and directions are well-organized, clearly communicated, and up-to-date (Reilly, 2020). Ensuring that learning objectives, activities and directions for collaborating with classmates are understood helps both learners and instructors to save time and confusion. Taking

time to ensure clarity, ease of access and intuitive navigation can be acts of care in online learning environments.

Since online teachers generally do not interact with students in a physical school or classroom, exhibiting care probably needs to be more deliberate than is necessary for onsite, face-to-face instruction. Some teacher practices in online classes that exhibit care include:

- ensuring course content and directions are organized and easy to understand,
- using a student interest survey to get to know the students, then create learning experiences based on their interests,
- structuring meaningful interactions among students for learning, using tools like videoconferencing breakout rooms and collaboratively authored documents,
- requesting and using regular feedback from students—generated, for example, with frequent, brief anonymous survey responses—about what is and isn't working for them in the course,
- getting to know students as holistically as possible.

While these practices that show care may be similar to what can happen in face-to-face classroom practice, the online medium requires that these actions be more planned and deliberate than what occurs in onsite teaching, in which teachers are able to have informal conversations and attend school events with students. Demonstrating care in online environments is, by necessity, more intentional and envisaged than when teachers and students are in the same physical spaces.

## **Engagement**

When we consider engagement in education, we typically focus upon student engagement in the learning that teachers are facilitating. Creating engaging instruction is an important goal for many, if not most, teachers, regardless of teaching context. Indeed, student engagement has been identified as promoting increased academic achievement and may be even more important to achievement than time spent in instruction (Boykin & Noguera, 2011). Learner engagement is prominent in the 2019 NSQ standards, which devote a standard and seven associated indicators to it. Indicators include: “D2: The online teacher engages learner agency;” “D6: The online teacher ensures that learners have necessary course resources and the information needed to navigate the learning platform and perform required tasks in a timely manner;” and “D7: The online teacher communicates frequently with stakeholders regarding learner progress and strategies for supporting learner engagement” (p.

16). Note that while students' engagement is emphasized in these indicators, it is extended to include teachers and other stakeholders, such as parents.

A new research construct—*teacher engagement*—has emerged as a way to understand and describe effective online teaching. Borup et al. (2014a) identified six elements of online teacher engagement: designing and organizing, facilitating discourse, instructing, nurturing, motivating, and monitoring. As such, student and teacher engagement go hand-in-hand. An engaged teacher who is facilitating discourse, instructing, and nurturing may be more able to create engaging learning activities based on knowledge of the needs, interests, and preferences of their students.

Engaged teachers should be even more available to K-12 students in online environments than in physical classrooms to help to maintain students' engagement in learning at a distance. They should monitor student progress as closely as possible, recognizing needs for and providing one-on-one assistance to students as necessary, including technical assistance as needed. Feedback on students' work should be timely, substantive, and frequent to help students to sustain their motivation for learning (Kennedy & Archambault, 2015).

The responsibility for encouraging student engagement does not have to rest solely with the teacher—or the student or parent, for that matter, in cultures in which engagement in learning is seen to be in the purview of learners and their families (Grant et al., 2014; Li, 2012). Borup et al. (2014b) expanded the teacher engagement construct to include community engagement by proposing the Adolescent Community Engagement (ACE) framework. This framework builds from the teacher engagement model, adding peer and parent engagement for adolescent online learners in particular. Other researchers have stressed the importance of onsite mentors or facilitators—generally school-based teachers who assist online students with their courses during the school day—as critical to the success of online students (e.g. Barbour, 2017b), thereby expanding the engaged community in support of online students even more. Facilitators help to foster relationships, monitor student work and interaction to help students to stay on-task, and provide supplemental instruction when needed. Although research about how facilitation may impact learning outcomes is still forthcoming, early results suggest that additional facilitation has generally positive effects (Borup, 2018).

Engagement is multifaceted in K-12 online learning, potentially involving students, teachers, and community members. Some sample teacher practices online that might demonstrate engagement include:

- providing opportunities for student choice in learning activities and topics,
- encouraging students to share their voices, interests, and perspectives in the class,

- monitoring student progress and supplementing instruction based on that progress,
- recognizing and acknowledging student growth and success,
- communicating with parents and school facilitators about students' progress and interests.

Engagement in online K-12 teaching and learning is complex. However, an engaged teacher can do much to open lines of communication so that students and their communities can participate more broadly in online learning processes.

It has been well-established that effective *teaching* and *teachers* lead to effective student learning, regardless of the contexts in which teaching and learning occur. It should be no surprise, then, that emerging research about effective *online* teaching demonstrates the importance of teachers' presence, engagement, and caring. Combined with the specialized knowledge required for effective teaching overall, and the specific expertise needed to teach in digital modes, these key practices, plus use of well-informed standards-based guidelines, can help teachers to construct, enact and facilitate supportive and engaging online learning environments for their students.

## **SUMMARY: HALLMARKS OF EFFECTIVE ONLINE TEACHING**

What, then, are the hallmarks of effective online teaching in K-12 learning contexts? As we hope that our examination of relevant research and practice publications has explained and illustrated, they are fivefold:

- technologically informed pedagogical content knowledge, or TP(A)CK;
- student-focused, curriculum-based, contextually sensitive pedagogical practice;
- awareness and astute implementation of current online teaching standards;
- demonstrated teacher presence, caring, and engagement online;
- all of which can combine to enact engaged, communal, and digitally responsible student learning online.

Given the nascence, complexity and acceleration of K-12 online teaching and learning at present, systematic examination of teacher knowledge and practice that leads to effective online pedagogy must continue. Ongoing development and refining of K-12 online teaching standards can—and should—be informed by relevant educational research, the future foci for which can—and should—reflect essential aspects of the online teaching and learning that the standards are designed to guide

and shape. In this way, research can inform practice as practice informs research, with K-12 students and their communities being the ultimate beneficiaries of these collaborative efforts.

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## **ENDNOTE**

- <sup>1</sup> In this chapter, we use the U.S. term “K-12” as a synonym for all grade levels in elementary/primary and secondary education, including kindergarten, but excluding preschool/nursery school.