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Original Research

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Impactful Digital Technology Coaches: Identifying Their Characteristics and Competencies While Delineating Their Role

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Abstract

Digital technology coaches (DTCs) often support teachers with integrating technology into their classroom and instructional program, as well as provide ongoing staff development. To be effective, coaches tend to have specific characteristics for instructional coaching and competencies for educational coaching. We investigated if these characteristics and competencies applied to effective DTCs while we observed their proficiency with technology, their interactions with other educators, and the way they provide support for the teacher-professional learning (PL) process. Three DTCs led over 80 K–12 teachers from the same school district in classroom coaching sessions, collaborative planning meetings, PL sessions, and conference presentations. In keeping with generic qualitative methods, multiple data sources including fieldnotes, artifacts, and transcribed interviews were analyzed. Through examining data detailing their role and impact on the learning of their teacher colleagues, it was apparent that these DTCs possess the characteristics and competencies of effective instructional coaches. Importantly, this study adds to the literature on effective coaches by documenting the applicability of these characteristics and competencies to not only instructional coaches, but also DTCs, elucidating their role, and explaining their influence on teacher PL.

Keywords: *digital technology coaches, coaching competencies, coach characteristics, teacher professional learning*

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Introduction

Teacher professional development (PD) is defined as "structured professional learning [PL] that results in changes in teacher practices and improvements in student learning outcomes" (Darling-Hammond et al., 2017; p. v). Optimally, PL opportunities support teachers in refining the practices necessary to develop student competencies (e.g., effective collaborative and communication skills, complex problem-solving, critical thinking). Coaching is seen as an effective approach to PD, as it is ongoing and provides teachers with authentic, job-embedded practices and experiences that are individualized to their teaching methods, needs, and interests (Kane & Rosenquist, 2018; Liao et al., 2021). The definition of coaching varies throughout the literature (Lofthouse, 2019); however, it is commonly viewed as a form of PD, grounded in teachers' daily problems of practice, in which a knowledgeable and skilled PL facilitator (i.e., coach) supports teachers in developing effective teaching practices that assist in fostering student learning (Knight, 2017).

Being knowledgeable in a subject area or instructional domain does not necessarily make a PL facilitator an effective coach, however. For example, technology proficiency is not an indicator that a coach will have a strong understanding of the contexts and goals of the schools they work with; be able to support colleagues in a way that fosters increased teachers' knowledge, skills, and confidence; have a desire to provide instructional and technical support; and/or have an understanding of how technology can be utilized to support teaching and learning (Carver, 2021).

Some essential components in supporting changes to teachers' technology integration practices in the K–12 classrooms include dedicated technology coaching PD (Grierson et al., 2022; Susin et al., 2023) and a team-based PL approach, such as administrators, support personnel, and teachers (Durff & Carter, 2019). Yet, previous studies have not evaluated the role of a digital technology coach (DTC) with criteria related to their attributes as a type of instructional coach. There is, however, literature related to instructional coaches, in general, that identifies requisite effective characteristics (e.g., Frazier, 2020) and a broad framework of competencies (e.g., Steinke, 2017) that can enhance coaching effectiveness.

Our research purpose was to address a void in the literature by examining the coaching attributes of DTCs who were making an impact in their school district (see Grierson et al., 2022; Gallagher et al., 2023; Susin et al., 2023). We wanted to identify their characteristics and delineate their role in relation to the coaching literature. Accordingly, we posed the following research question: Do the 10 characteristics of effective instructional coaches (ICs) from Frazier (2020) apply to effective DTCs?

Background Literature

There is a growing interest in professional learning (PL) based on the need for effective professional development PD to support teachers in learning and refining the pedagogies necessary for teaching the increasingly more complex skills that students must develop for further education and 21st-century work (Darling-Hammond et al., 2017). Coaches in education are often responsible for providing these opportunities to support teacher learning (Carver. 2021) and are oftentimes experienced teachers who specialize in a specific area (e.g., technology, literacy, mathematics). Coaches are hired by the district to provide teachers with support that is focused on improving student achievement (Killion, 2020; Kraft et al., 2018).

In addition to specializing in a specific area, coaches are required to learn new pedagogical and content-focused knowledge and skills to remain knowledgeable of the latest research regarding teaching practices. They must also be adept at sharing and assisting in the integration of new content, approaches, and resources in the classroom (Giamellaro & Siegel, 2018; Knight, 2009b).

Although many forms of coaching exist (e.g., literacy, instructional, technology), the constant across all content areas and forms of coaching when sharing knowledge and practices is: Effective coaching should promote a coach–teacher partnership, not a top-down approach (Giamellaro & Siegel, 2018; Kise, 2017; Knight, 2009a, 2017, 2021). Coaching is not meant to serve as a position of power, but a collegial relationship that draws on coaches' experiences and expertise to aid colleagues in bringing about positive change in their classrooms (Carver, 2021; Lofthouse, 2019).

Coaching can be of particular importance when supporting teacher growth, especially when implementing new practices (Knight, 2021). For example, expanding the use of educational technology is new and complex for many teachers (Olszewski & Crompton, 2020). Technology can have a positive impact on learning and digital skill development (e.g., Cochrane & Antonczak, 2015), but despite being widely available and commonly used in K–12 classrooms, the way it is integrated into the classroom does not always maximize its potential (Olszewski & Crompton, 2020). For technology to be used effectively and efficiently, students and teachers need to have the competencies required for using the technology available to them.

School districts have come to recognize the ongoing need to enhance technology use through the increase of resources and support available to teachers, who are sometimes challenged to use technology in ways they envisioned (Liao et al., 2021). Through DT coaching, teachers can receive individualized support to develop their DT competencies with content-specific resources, pedagogy-focused instruction, and engaging, hands-on experiences (Liao et al., 2021).

Coaches work closely with classroom teachers to implement shared goals and district-wide practices; plan and deliver lessons to improve student achievement; and critically reflect on their practices—all while fostering a learning environment that is supportive and instills trust to improve teacher receptivity (Carver, 2021; Frazier, 2020; Kane & Rosenquist, 2019; Knight, 2009b, 2017; Lofthouse, 2019; Walpole & McKenna, 2012). Coaches must also be adaptive to the needs of the teacher and the complexity of the support they provide, as teachers may be at different stages in their use, understanding, and implementation of technology (Thomas & Reeves-Brown, 2021).

Although titles vary across literature for coaches who specialize in the knowledge and implementation of technology in the classroom, this paper will refer to these coaches as Digital Technology Coaches (DTCs)—the title utilized by the district involved in this study. Current literature, however, often refers to these coaches as Technology Coaches (TCs; e.g., Liao et al., 2021; Ottenbreit-Leftwich et al., 2020), Instructional Technology Coaches (ITCs; e.g., Carver, 2021; Crompton, 2020), and Educational Technology Coaches (ETCs; e.g., Drennan, 2019; McBride, 2021).

Research also distinguishes online/virtual TCs from in-person TCs (e.g., Sugar & van Tryon, 2014). This difference has been blurred, though, given evolving practices resulting from the shift to an online delivery format during the COVID-19 pandemic school closures. Despite the inconsistent language, the role of DTC can generally be defined as, "a certified teacher who can support the implementation of instructional programs, provide staff development, and coach teachers on the integration of technology into instruction in [different] content areas" (Carver, 2021, p. 132).

The DTC process requires a long-term commitment. The time required for the development of a trusting teacher–coach relationship and for teachers to enhance their DT competence and confidence (Skues & Cunningham, 2013; Woo, 2016) is significant, as it is essential for DTCs to begin with an identification of teachers' needs, allow teachers to self-determine the DTCs agenda (Nelson & Webb, 2016), and then work collaboratively to address them in a non-intimidating manner (Woo, 2016). Clearly, some school districts struggle to find the funding, time, and human resources necessary to provide such individualized PL (Blanchard et al, 2016; Kopcha, 2012). Although there appears to be scant literature outlining the competency

requirements and characteristics of effective DTCs, these have been documented with respect to instructional coaching.

Instructional coaches (ICs) must meet certain competency requirements. And although these requirements may vary depending on the model a coach uses, Steinke (2017) discusses a general framework where coaches must generally demonstrate: *subject matter competence* (expressed via their educational background); *methodological competence* (ability to solve problems flexibly and develop and implement plans independently); *social and communicative competence* (establishing and maintaining collegial, collaborative relationships); *personal competence* (self-reflective ability, flexibility, credibility/integrity, attentiveness, and independence); and *field and role competence* (experiences specific to their field of work, ensures comprehensive support can be provided). Within our conceptual framework, these five competencies will be discussed further in relation to the characteristics of effective ICs (Frazier, 2020) with a focus on DTCs.

Conceptual Framework

Although coaches enter the coaching role with experiences and knowledge from their previous teaching role, the existence of specific characteristics impacts the effectiveness of their coaching. Aligning with Frazier (2020), we define effective leadership as the ability of an individual (e.g., coach) to positively influence others (e.g., teachers) in achieving a commonly set goal (i.e., changes in practice, student achievement, growth as learners and educators). With this understanding, the 10 characteristics of effective ICs from Frazier (2020), including *collaborative*, *caring*, *trustworthy*, *competent*, *authentic*, *quality communicator*, *inspirational*, *flexible*, *planned*, and *models* (as outlined and described below), are used as a framework for analysis in this study, which seeks to explore whether these characteristics apply to effective DT coaching.

The main, overarching characteristic of effective instructional coaching is *collaborative*. This means that coaches believe that coaching is a partnership (e.g., coach–teacher partnership; Kise, 2017; Knight, 2017) that values and respects each member's time, expertise, and experience (Frazier, 2020). It is through these synergistic relationships—the balanced participation and equal partnership—that the success of their work, the likelihood of overcoming difficult challenges, the teacher's receptivity to learning and change, and the building of self-confidence among teachers can all be influenced positively (Frazier, 2020; Knight, 2009a, 2017, 2021).

Coaches exhibit *care* that both encourages and is influenced by colleague collaboration (e.g., teachers)—a complementary process that mirrors the reciprocity between them (Knight, 2009a). Educational leaders (e.g., coaches) must invest "the time … and have the capacity to understand, communicate, or value teachers' and students' emotional needs" (Frazier, 2020, p. 42). Care is a foundational characteristic (a central component) of effective coaching that supports ICs in developing a strong rapport with teachers; this serves as a determining factor in teachers' receptivity to the IC and willingness to participate in PL (Frazier, 2020).

Trustworthy falls on the caring side, according to Frazier (2020), who relates one's trustworthiness to the four "Cores of Credibility" outlined by Covey (2006). Covey's Cores of Credibility hold integrity (practicing what one preaches) and intent (one's motive or agenda) to an individual's character, while capabilities (talents, attitudes, skills, knowledge, and style) and results (tangible, measurable end-product/purpose) speak to one's competence. It is important to recognize that a coach's character and competence influence the coach–teacher relationship.

Competent, as Frazier (2020) outlines, aligns well with the general coaching competency framework proposed by Steinke (2017). These competencies serve as the "tools" for coaches to use to attain their goals (Wise & Hammack, 2011). For example, in order to facilitate learning and performance, coaches may draw on their

methodological competence and *field and role competence* to develop and implement plans, handle tasks, and solve problems (Steinke, 2017).

Although presented individually, Frazier (2020) highlights that the characteristics of effective ICs must be considered in connection to one another. For example, the *authentic* characteristic serves as a refining process (a filter) that ICs must use as they work towards improving their effectiveness. When this filter is used as a layer to a coach's competence, their authenticity and credibility are considered. It is difficult to fake competency, as it quickly becomes apparent what a coach knows (and does not know). A coach's authenticity goes a long way in determining a teacher's willingness and receptivity to collaborate (Frazier, 2020).

The ability of a coach to be a *quality communicator* is also highlighted as key to their effectiveness (Frazier, 2020; Knight, 2007, 2022). More specifically, when considering the characteristic of "caring" as an additional layer to a coach's communication skills, emphasis is placed on a coach's ability to empathize and encourage. It is important to note that a coach's ability to listen, as well as how well they listen, can impact their (level of) ability to provide both support (Frazier, 2020).

Drawing from aspects of the other characteristics, Frazier (2020) expands on the importance of *inspirational* ICs who are invested in—and care for—those they work with and who are extremely skilled in what they do. This can be likened to Knight's (2022) notion that inspirational coaches—those who have a positive impact on those they work with—can be seen as leaders. Inspirational coaches make good decisions, engage in interactions that expand their capacities, support deep knowledge and implementation, align themselves with others, and lead themselves by knowing their purpose and principles, utilizing their time effectively, taking time for themselves, etc.

ICs who offer teachers *flexibility*—different choices in addressing specific instructional goals that have been determined together—empower teachers to play an active role in the decision-making process and increase their willingness to implement the selected strategy (Frazier, 2020). Using flexibility, coaches and teachers can add to their toolboxes by becoming more resourceful and creative in their strategies and approaches. Flexibility in coaching also allows for the adaptation to frequent changes that occur at the school and district levels.

Frazier (2020) shares that coaches who *plan* for their teacher sessions are characterized as effective ICs. Coaches should prepare for each session with relevant and meaningful resources and structures, which are personalized for the teacher and the goals they have developed together. Knight (2017) also suggests planning a way to assess the degree to which the teachers understand the information and practices being presented, as this will ensure that the various resources are being effectively implemented in the classroom.

Lastly, effective ICs incorporate different *models* in their practice. Modeling is a well-known powerful teaching strategy, whereby educators demonstrate what students are to do and how they should do it, and provide examples of what is expected (Frazier, 2020; Knight, 2007). Effective ICs use this strategy in various ways (e.g., co-teaching, video analysis, "I do, we do, you do," activities; p. 258) to make learning easier and more enjoyable for the teacher (Frazier, 2020).

Methods

This research followed a generic qualitative research approach in which methods were used to capture the varied perspectives of multiple participants within their contexts. This research approach also allowed for broad interpretations of data without being constrained (Caelli et al., 2003; Kahlke, 2014). A generic qualitative research approach can elucidate the documented attitudes, beliefs, personal opinions, or reflections of one's experiences (Percy et al., 2015). This approach was suited for this research as the experiences of the DTCs and teachers were garnered to also provide evidence of their practices and PL. Accordingly, different generic

qualitative methods (Creswell, 2012) were employed to extract meaning from the field notes, artifacts, and transcribed interview data.

Participants

This study extended across 4 academic years (2016–2017; 2017–2018; 2018–2019; 2019–2020) with some changes to DTC participants in Year 2 (2017–2018). Teacher participant changes occurred year-over-year. All participants have been assigned pseudonyms.

Digital Technology Coaches

Three DTC participants within a publicly funded Southern Ontario school district (student population +20,000) were included in the study, with one of the three coaches (Helen) being followed more closely throughout the last 3 years of the project. Jake worked as a K–12 DTC during Year 1 and Year 3 of the study, taking on the role of a DT consultant in Year 2. Prior to working in these coaching and consulting roles, Jake worked as a secondary teacher for 10 years, teaching mathematics, computer science, technology design, computer engineering, and construction. Reid worked closely with Jake as a DTC during Year 2 of the study. His background was as an elementary teacher for 8 years. Helen served as a district DTC for all 4 years and joined the study in Year 2. Prior to working as a coach, Helen worked as a teacher for 17 years, teaching students in grades 4–12 during her time in Australia and Canada in publicly- and privately-funded school settings. For a discussion on the impact of their work on teacher PL, see Grierson et al., 2022; Gallagher et al., 2023; Susin et al., 2023.

Teachers

The teacher participants (n = 89) are summarized in Table 1. There were two teachers (Matthew; Layla) who participated in Years 2–4; there were three teachers (Monica, Casey, Molly) who participated in Years 2 and 3; and 5 teachers (Caitlin, Susanne, Trisha, Jane, Lauren) that participated in Years 3 and 4.

Table 1. *Teacher Participants for Years 1–4*

Year	Teachers	Grades	DTC
Year 1	16	Secondary (grades 9–12) • English (n = 12) • ESL (n = 1) • Technology (n = 2) • Music (n = 1)	Jake
Year 2	25*	Grades K–4 (n = 12) Grades 5–8 (n = 11) French (n = 2)	Helen Reid
Year 3	40	Grades K–4 (n = 20) Grades 5–8 (n = 17) French (n = 1) ESL (n = 2)	Helen Jake
Year 4	20	Grades K–4 (n = 15) Grades 5–8 (n = 4) ESL (n = 1)	Helen

**An additional 63 teachers participated in PD and robotics training sessions.*

Data Collection and Analyses

This study utilized qualitative methods for gathering data (Creswell, 2012). Across the 4 years of the study, researchers collected field notes and artifacts during classroom coaching sessions, collaborative planning meetings, PD sessions, and conference presentations. Researchers also conducted a series of interviews with both DTC and teacher participants each year throughout the academic terms.

Field Notes and Artifacts

In Year 1 of the study, 14 field notes were taken during observations of classroom coaching. These notes were specific to one-on-one and small-group coaching sessions with DTC Jake.

In Year 2 of the study, 20 field notes were collected. Of these 20 notes, 11 observations were during classroom coaching sessions; five were during collaborative planning meetings among Helen and several teacher participants; and the additional four field notes were taken during PD sessions specific to the robotics kits being utilized. There were nine to 16 teacher participants in each session.

In Year 3 of the study, 73 field notes were collected during observations. One of these field notes was taken during a conference presentation at an educational technology conference. The remaining 72 field notes collected were during the following activities: 13 one-on-one coaching sessions, 51 in-class observations, eight teacher small-group coaching sessions, and seven student small-group coaching sessions.

In Year 4 of the study, 23 field notes were taken during classroom coaching observations. Two of the observations were from one-on-one coaching sessions, 18 were during in-class coaching sessions, one was from a teacher small-group coaching session, and two were from student small-group coaching.

Artifacts were used throughout the study. These were items that the coaches shared with the teachers during their activities. Artifacts included co-created lesson plans, PowerPoint presentations used in sessions, and professional readings and texts to extend teacher learning.

Interviews

Across the 4 years, DTC Jake was interviewed twice (once in Year 1, once in Year 3). DTC Helen was interviewed eight times (twice in Year 2; four times in Year 3; and twice in Year 4). During their interviews, Jake and Helen were asked to describe the activities of their role, their accomplishments/challenges, teachers' attitudes/beliefs, collaborations, PL facilitation, what they have learned, and their future goals in the DTC role. DTC Reid was not available to be interviewed, but field notes were taken during his interactions.

Over the 4 years, a convenience sampling of 22 teacher participants, coached by Jake (six in Year 1) and Helen (four in Year 2; nine in Year 3; and three in Year 4), were interviewed. During their interviews, teachers were asked to describe their own background; their strengths and challenges as a teacher; their experiences with their DTC; any changes to their practice; any impacts on their students as a function of the DT coaching; their attitudes/beliefs, collaborations, and what they have learned; and their future goals related to digital technology in the classroom.

All interviews were one-on-one with a researcher. Each was audio recorded and transcribed. Transcriptions were member checked with participants.

Data Analysis

To analyze the data, all field notes, artifacts, and interview transcripts were uploaded into qualitative software, NVivo (QSR International Pty Ltd, 2015). Once the excerpts were read within the NVivo program, nodes (codes for common ideas) were created using its open-ended coding process. As an example, there were nodes labeled: *collaborate with school district administrators*; and *liaising with teachers, supporting teachers*. The

nodes that represented these data were labeled: *collaboration/lack of*; *relationships*; *beliefs about coaches*; and *effective coaching*.

Next, these four broad nodes were interrogated by two of the researchers using the 10 characteristics of effective instruction—*collaboration*, *caring*, *competent*, *authentic*, *quality communicator*, *inspirational*, *flexible*, *trustworthy*, *planned*, and *models*—from Frazier (2020). The researchers noted that the nodes had variances in meaning within them, and some of the nodes could be represented as subdivided subnodes. For example, for the node *collaboration/lack of*, there were subnodes, such as *coach–coach collaboration*, *poor collaboration*, *student collaboration*, *teacher–coach collaboration*, *teacher–teacher collaboration*.

Next, all the nodes and their subnodes were sorted and categorized using Frazier's (2020) framework of the 10 characteristics of effective instruction to reflect their connections and shared meanings. This was accomplished in a characteristics matrix built during the 4 years of the study—some nodes and their subnodes could be represented by more than one of the 10 characteristics. Alternatively stated, the researchers found that several of the 10 characteristics of effective instruction fit within multiple nodes and their subnodes. This cross-confirmation was embraced and is described in the findings. There were also several (five to nine) subnodes (e.g., use of time; lack of planning), in each of the 4 years, which did not align with the 10 characteristics of effective instruction. These were omitted.

Findings

The findings are presented as illustrations of the 10 characteristics of effective instruction (Frazier, 2020) in response to our research question: Do the 10 characteristics of effective instructional coaches (ICs), from Frazier (2020), apply to effective DTCs?

The following is a description of each characteristic and examples of the DTC practices—with supporting evidence from both DTC and teacher data. Although presented separately for clarity in this section, we concur that the 10 characteristics of effective instruction (Frazier, 2020) in coaching practice are interconnected and interrelated.

Collaboration

Collaboration is seen as a robust way to develop ideas and find creative ways to problem-solve (Frazier, 2020). Collaborative coaches respectfully listen to others, and they are interested in what their colleagues have to say. Collaborative coaches use positive language when speaking, they ensure that the focus is on student learning, and they maximize available collaborative time.

Throughout this study, the DTCs promoted a collaborative environment and encouraged the development of collegial connections. During a PD session, for example, DTCs were observed encouraging teachers to share their practices, experiences, and resources with one another.

> [Helen] and [Reid] engage in discussion with the teachers about what they have seen in the classrooms being done with the kits (e.g., who is doing what and how). The teachers are very engaged in hearing about other teachers' best practices (Researcher's Field Notes, January 24, 2018).

The DTCs also acknowledged how imperative it was to maintain strong collegial relationships with other support staff and to connect on a regular basis. By working together with other school district consultants, DTCs were able to provide widely accessible teacher PL for integrating technology in their online lessons during the pandemic school closures.

Throughout the study, it was apparent that the DTCs prioritized collaboration amongst themselves, the teacher participants they worked closely with, and the students within each teacher's class. Their collaborations were not limited to the classroom but extended to PD workshops and online webinars. The DTCs encouraged both the sharing of ideas and resources across school rosters to help foster student learning.

Caring

Coaches who are *caring* are interested and invested in the growth and happiness of the teachers they work with (Frazier, 2020). Caring ICs often consider others, work on tasks for others without being asked to do so, are greatly appreciative of others and their work, consider the best interests of others, and commit to building strong collegial relationships with personalized support to those they coach (Frazier, 2020).

DTCs, in this study, recognized the importance of cultivating and sustaining trusting, collegial relationships with their teacher colleagues. They prioritized these relationships and perceived their dedication and sincerity in building these relationships as essential to their successful interactions, as well as a key component of the long-term impact of their coaching. When developing these strong collegial relationships, coaches invested time in tailoring their coaching to the practices of each teacher participant. In a June 5, 2017, interview, Teacher Jane observed:

> We have one individual [who] comes in[to] our school and he actually sits with us and works with us. For me, that works best because I have specific questions … [that are] tailored for my own teaching journeys and where I'm at. We are all at different places I think. … [S]o, I get you know instantaneous responses and concrete [examples], something I can take away with me the next day and try.

DTCs also acknowledged the importance of assisting one another, especially when their responsibilities increased because of the demands on their role during the sudden shift to online teaching during the COVID-19 pandemic. The DTCs were mindful of their colleagues' workload and recognized the pressing need for collegial support. When discussing their need to respond quickly to emails given the immense influx in requests for DTC support from teachers, DTC Helen shared in a June 9th, 2020, interview:

> [Jake] has a lot of other responsibilities, so we would be talking and literally he'll be like it['s] … Monday and he … [is] just getting [to] Thursday's emails and I … [wondered] why it [was not] Thursday morning emails by Thursday night. … It was just crazy, so we tried to take a lot of his load as well because he has so many ministry things and so many other responsibilities.

The characteristic of care became increasingly integral for the DTCs to possess during COVID-19 school closures. It was during this time that they learned how to rely on—and support—one another while they supported classroom teachers.

Trustworthy

Successful ICs are *trustworthy*; they build trust with the teachers they work with when they follow through with their tasks and responsibilities. Successful ICs are truthful and willing to be vulnerable to grow in their capabilities as coaches (Frazier, 2020).

The DTCs were observed frequently checking in with teacher participants and school principals to see how they could support the teachers and their classes. Teachers appreciated the willingness of these coaches to revisit classes for follow-up with ongoing projects and resource implementations. Developing strong, collegial relationships was prioritized by these coaches, and given their ability to build these relationships quickly, they were able to easily gain the trust of teacher participants and students. In the April 9, 2019, Researcher's field notes, it was reported that:

> [Helen was] very flexible and friendly. [They have] built professional relationships with the staff at the school and the principal, and [they have] a good rapport with all the staff and students in the building. [Helen was] very quick at building relationships with the students and gain[ing] their trust and interest.

Importantly, these DTCs were willing to admit when they did not know something or when things did not work. They were willing to seek new knowledge or troubleshoot on the spot. As researchers wrote in their field notes on February 23, 2018, during a robotics PD session:

> Teachers go back to exploring and learning with their robots—[Helen] has a good discussion with teachers about the struggles they are having and how it is a common one students have. [They inform] the teachers that [they] too learn as [they go] and [do] not have all the answers, which is why it is important to explore the software and features.

The trust teacher participants had in their DTC was apparent. This trust influenced their receptiveness to the resources and practices the coach provided. The coaches' willingness to be vulnerable was appreciated by teacher participants and students.

Competent

Competent ICs have the knowledge and understanding to plan and apply effective instructional practices for teaching and coaching as they are aware of current research, share new data and practices, and provide suggestions for improving practice (Frazier, 2020). Simply put, competent coaches meet the needs of both the teachers they work with and their students.

The teachers who participated in this project appreciated the technological knowledge and skills that the DTCs were equipped with and brought to their coaching sessions. Teachers were eager to implement technology, and their confidence in utilizing the available technology grew over the course of their coaching sessions. As Teacher Maddison shared in a June 11, 2018, interview:

> [Helen] has come in; I've met with [Helen] two or three times this year, and each time I've come away with a wealth of ideas that I was able to share in the digital stuff. The first one that, when we met, [they] introduced me to stop animation for my students, which was something that was just part of another conversation, and [they] showed me it and I was like, "oh wow, I think my kids would love this cause they do love that kind of stuff."

DTCs continuously worked to extend their knowledge of the various resources that were utilized by teachers across the district. Teachers viewed DTCs as competent when they provided them with the opportunity to actively engage with the technology, beyond learning about new practices and resources. This was carefully considered by a secondary school teacher, Antionette, who noted in a June 5, 2017, interview that:

> The [workshops] that were most beneficial were the ones [where] we were able to collaborate with one another and sit down and we would each, you know in this case, have our computer, talk it out, and um, explore like that … we could have … a lead consultant or coach, walking us through, but when you actually physically do it, that's the most beneficial, I think.

Consistent with Frazier's (2020) assertion, teachers' perceptions of DTC competence, exhibited by these DTCs, were fostered by the provision of practical suggestions and awareness of how current research could inform teachers' technology integration.

Authentic

ICs exhibit the *authentic* characteristic when they demonstrate credibility and trustworthiness, aim to be consistent with their values, and appreciate the learning of both students and teachers (Frazier, 2020). Authenticity is also evident in the way that coaches model practices they know and understand, act and debrief, or communicate with teachers. In essence, they "walk the talk."

DTCs in this study kept a growth mindset as outlined by Dweck (2006) when reflecting on their PL, and they sought ways to advance their professional practice (see Grierson et al., 2022). They then brought this reflection to their practices and encouraged teacher participants to hold an optimistic view on integrating new technologies in the classroom. Coaches acknowledged that new resources and practices would take time for teachers to implement, and that some teachers might face barriers. The coaches worked to maintain teacher engagement and motivation, and their willingness to be vulnerable and share their experiences was widely respected by teachers. According to researcher field notes from January 17, 2018:

> [Helen] does a very thorough job explaining how the kits are set up, the components, and potential problems that kids typically face when first engaging with the kits. [The coach's] explanations stem from personal experience and from working with teachers implementing the kits in their classrooms. [Helen] walks around to discuss [their] own experiences in implementing the kit with [their] previous students as the teachers work. The teachers appreciate hearing about the struggles and successes [they] faced in implementing different projects. (Researcher's Field Notes, January 17, 2018).

In addition to pursuing their own PL opportunities and considering ways to advance their professional practice, DTCs realized the value of learning from students. When co-teaching in the classroom, coaches appreciated the knowledge students came to class equipped with and invested time in learning from them. Coaches asked students to explain to them what they were doing, which helped foster collaborative relationships. For example, it was recorded in the researcher's field notes, on April 9, 2019, that when working with a group of primary students, "[Helen told] the students that she need[ed] training with [an online learning platform] and ask[ed] the students to teach [them]. [Helen] engage[d] the students in questions about the challenges they are playing with" (Researcher's Field Notes, April 9, 2019).

Throughout the 4 years of this project, it was apparent that the authenticity of these coaches influenced teachers' receptivity to the support they provided. These DTCs were genuinely invested in the learning and growth of each teacher and their students. For teachers, this highlighted the dedicated support they had available to them for the learning, implementation, and follow-up of effective technology integration in their lessons and classrooms.

Quality Communicator

As *quality communicators*, ICs use clear, positive, and intentional language. ICs clearly articulate the roles of each individual; listen to and understand the needs of teachers; and provide specific feedback and suggested instructional strategies that address the needs the teacher(s) have identified (Frazier, 2020).

The coaches in this study recognized the importance of fostering meaningful communicative connections while maintaining student engagement and providing teachers and students with technology support. It was imperative that the coaches engaged with teachers and students, at their respective levels, about the technology being used. It was clear that the coaches' experiences as former teachers influenced how they interacted with students and fellow teachers. According to April 17, 2018, field notes, the following vignette is indicative of the interconnectedness of the DTCs' authenticity and quality communication:

> [Helen] is excellent at explaining the steps to the students in student-friendly language. [They] make sure to talk to them "at their level" making references and comparisons to things they would know/be familiar with (e.g. waffle = breakfast food; sometimes it's a circle, sometimes it's a square; we put maple syrup on it—she has them guess the name of the button this way; "what kind of pictures would be good ones for Earth day?" She has them outline things that represent Earth day prior to having them choose pictures for their collage.

The importance of communicating effectively was amplified during the COVID-19 pandemic school closures. The coaches were committed to responding to emails promptly to encourage collaboration and ongoing dialogue with teacher participants. During the pandemic school closures, Helen "had a fast return rate [and] … was known [for] getting back to people every half an hour (Helen, DLC, Interview, June 9, 2020).

The ability of coaches to communicate effectively helped develop strong collegial relationships with teacher participants and administrators. Coaches were able to provide suggested next steps for technology integration and program planning.

Inspirational

Inspirational ICs enjoy learning with others and are committed to their own personal and professional growth (Frazier, 2020). Inspirational ICs are enthusiastic and tenacious in their practices and exude positivity during their coaching interactions.

Coaches in this study shared their excitement in stepping into the PL facilitator role and continued learning. During Year 3 of the study, the DTCs opted to participate together in a book study to learn new strategies and ways to improve their practice. They reflected on their coaching and identified ways in which they could better support teachers. They felt that learning alongside other DTCs strengthened their learning outcomes and allowed them to draw on one another's strengths, especially during the COVID-19 school closures, as discussed by DTC Helen in a June 9, 2020, interview:

> Once that tech piece of [an online learning space] came, people were reaching out for subjects. We teamed with Math, and webinars and we would be there to learn, that would be there for us and teachers too. … So, we had that expertise too.

Teachers praised how effective these DTCs were and appreciated the time dedicated to their coaching sessions. The DTCs prioritized the richness of students' learning experiences coupled with supporting teachers in their professional practice. It was evident that teachers thought highly of their DTCs. For example, teacher Caitlin stated in a June 4, 2019, interview:

> This coaching by [Helen] was so effective and ongoing. [They were] coming in and always available. [They were] always quick, easy to read and understand. It was ongoing and interactive, [they] came in and showed the kids or showed me. Because of the ongoingness of it and the interactions between myself and the kids with [Helen] that's why it was highly effective. I've been to so many workshops where you just sit and do nothing and you leave with nothing. With [Helen], it was really good. It was excellent because that's how I learned by doing.

The DTCs inspired teachers by leading by example, as they continually strived for opportunities to enhance their PL. They were also willing to share their experiences with the teachers they coached. This implicitly and explicitly communicated to teachers that learning is a career-long pursuit.

Flexible

Successful ICs are *flexible* when they provide teachers with choices for addressing collaboratively determined goals (Frazier, 2020). This flexibility also helps teachers feel empowered and increases their willingness to implement the strategies and/or practices. Coaches enter these collegial relationships ensuring that they tailor their coaching to the individual needs of each teacher and are willing to source alternative solutions and resources where and when necessary (Frazier, 2020).

The DTCs were able to adapt their plans to ensure they met instructional requirements, the grade(s) and age(s) of students, and the associated skill level(s) of both the students and teacher participants when working with the technology available. In researcher field notes from March 20, 2018, it was stated:

> [Helen's] coaching really focuse[d] in on supplying the teachers with ideas on extending their uses of technology. [They were] able to effectively cater this to each teacher as they [were] learning at different levels. [Helen] also provide[d] more of a mentoring/coaching component specifically to [the teacher] to help [them] feel more confident in [their] use of technology.

Given these coaches' experiences as former teachers, they understood what teachers and students were seeking during the coaching sessions. This experience enhanced their ability to consider new technology and practices from the perspectives of both teacher participants and their students, and to reflect the understanding of the students and teachers. According to Teacher Caitlin, in a June 4, 2019, interview:

> I [felt] like I had no challenges. I [felt] like every question I was able to ask [Helen, they were] able to respond. [Helen was] great with the class and as well with leading the class with instructions. If I had a question and if [they were] teaching the class and I was helping [they were] able to stop. Sometimes the kids know more than you do, so [the coach was] able to stop and show me and go back so that I could keep up to speed. I felt that there wasn't any challenges, no frustrations on my part. When I came away, I felt good about what we were doing.

DTCs were perceived as flexible when they provided teachers with focus area options support and were willing to alter their plans for coaching sessions to adjust to dynamic classroom-based contexts (e.g., internet outages). Their flexibility was increasingly important throughout the pandemic school closures given the continuous fluctuations in class delivery, health and safety protocols, and increased reliance on technology.

Planned

Teachers appreciate ICs who planned for their coaching sessions. These ICs provide relevant, meaningful, and personalized resources to them and their teaching (Frazier, 2020). ICs regularly check in and follow up with their teachers on collaboratively developed goals and action plans (Frazier, 2020).

As technological resources often varied from school to school, the DTCs needed to rely on the portable resources. In some instances, teachers were surprised by the dedication DTCs had for sourcing limited technology. When sharing her experience working with a teacher participant, DTC Helen noted in a December 8, 2017, interview:

> There was a couple people I followed through with because the one was looking for an Italian keyboard. I found this add-on that I asked my colleague [about], and he said there's a really good add-on for that, so I emailed her this morning and got the email back saying, "[O]h thanks, I didn't expect that. It's like they didn't expect and like, "[W]ell I told you I was going to email you back."

DTCs in this study scaffolded teachers' technology integration and encouraged the use of relevant, practical activities in their classrooms. Throughout the study, DTCs made sure to plan and provide consistent support

that was tailored to the needs of their teacher colleagues. Teacher Kara shares, in a June 9, 2017, interview, how this support is helpful:

> [Jake] came and has been coming for a few sessions when we've invited [them] and just having that one-on-one help, you know, really helped us. Like [they] would just ask us: [W]hat do you need, what do you plan on doing this is how you should do it. So, [they were] very, you know, [they were] able to understand what our needs were and what worked best. So, do you know how to use a Google classroom or a Google site and so [they] showed us that as a management tool, it was very beneficial.

Since many schools lacked the necessary resources for the planned programming, it was imperative that the DTCs be equipped with the technology and resources that they needed to carry on with the scheduled session. Coaches' organization and preparation proved to be important in ensuring the sessions worked towards these teachers' established goals, as well as the areas teachers identified as those in which they required support.

Models

Effective ICs regularly look for opportunities to learn and refine their teaching (Frazier, 2020). They demonstrate quality instruction through modeling, co-teaching, observing the teaching of others, and guiding how to analyze the instruction and self-reflect (Frazier, 2020).

DTCs in this study often took on the role of a classroom teacher and modeled effective technology integration within a lesson. During these lessons, the DTs capitalized on teachable moments and consistently provided clear instruction. Teachers appreciated the time the DTCs took to model instruction when co-teaching lessons, as well as the time for one-on-one sessions to discuss how to implement new technology and teaching practices. Researchers observed in April their 16, 2019, field notes:

> [Helen] explain[ed] what practice opportunities look like that the teachers [could] do in the classroom with their students. The teachers asked if they [could] log into one of their students' accounts to see what the student view looks like. The teachers log[ged] on and they view[ed] the practice booklet to see what the students [saw]. [Helen] provide[d] the teachers with technology advice, as well as teaching advice related to technology.

As DTCs worked with teacher participants over an extended period, they started to see the changes teachers were making to their practices; teachers also began to feel refreshed in their practices. The modeling DTCs provided brought a renewed outlook on teaching for some and fostered self-reflective practices among their teacher colleagues. As Teacher Matthew shared in a June 7, 2019, interview:

> I think I have a lot to learn, I like it. I look forward to her coming to my classroom. Something I ask to her every time is, what's new? What can you show me that I haven't done? If I keep doing that it's really refreshing. I think that's something, to see where it takes us. Now I look forward to those visits, and it's a good attitude and it reflects well on the kids. Noticing that everything is not going to go perfect.

The modeled instruction that coaches provided not only demonstrated how teachers can integrate technology and new practices into their teaching but also sparked a motivation among teachers to engage in ongoing PL.

Discussion

There was previous documentation of how these DTCs effectively influenced the PL of the teachers in this school district (Grierson et al., 2022; Gallagher et al., 2023; Susin et al., 2023). The current study has focused on establishing if these effective DTCs' attributes align with established literature and how this contributes to

an explanation of their impact on teacher PL. Herein we return to our research question: Do the 10 characteristics of effective instructional coaches (ICs), from Frazier's (2020), apply to effective DTCs?

Throughout our findings section, we documented how the DTCs in this study exhibited each of Frazier's characteristics of effective ICs. Clearly these 10 attributes also apply to effective technology coaches, which confirms the applicability of this framework to DTCs. This is an important novel contribution to the DTC literature.

Furthermore, as previously mentioned, a coach's proficiency in a domain is not the only factor to consider in an effective coach (Carver, 2021). Effective coaches must also possess methodological, social and communicative, personal, and field and role competencies (Steinke, 2017). In comparison to the 10 characteristics of effective ICs, as defined by Frazier (2020), subject area proficiency may fall within the competent characteristic. Similarly, when comparing the characteristics of effective ICs (Frazier, 2020) exhibited by the DTCs in this study—as detailed in our findings—to the general coaching competency framework proposed by Steinke (2017), one or more of the identified 10 characteristics displayed by these DT coaches "fit" within each component of the framework. This alignment between the characteristics and framework is displayed in Table 2.

Table 2. *General Coaching Competency Framework[1] (Steinke, 2017) by Characteristics of Effective IC[2] (Frazier, 2020) for DTCs.*

		General Coaching Competency Framework[1]				
		Subject Matter	Methodological	Social & Communicative	Personal	Field & Role
Characteristics of Effective IC[2]	Collaborative			✓		
	Caring			✓	✓	
	Competent	✓	✓	✓	✓	✓
	Authentic			✓	✓	
	Quality Communicator			✓		
	Inspirational		✓		✓	✓
	Flexibility		✓		✓	
	Trustworthy	✓	✓	✓	✓	✓
	Planned		✓			
	Models	✓	✓	✓		✓

Although being *trustworthy* speaks to one's integrity, which aligns specifically with the *personal* coaching competency, this characteristic "fits" within each competency outlined by Steinke (2017). As Frazier (2020) indicated, the *trustworthy* characteristic is related to the four "Cores of Credibility" developed by Covey (2006). As such, a coach's capabilities align with a coach's *subject matter* and *field and role* competencies, their results fit within the *methodological* and *personal* coaching competency, and their *intent* relates to their *social and communicative* coaching competence.

When considering this alignment, it is apparent that the characteristics of being *competent* and *trustworthy* are the most instrumental characteristics of coaches (followed by *modeling)*. Clearly, it is also evident that *social and communicative competency* is important for DTCs to have. Considering Frazier's (2020) outline of the *competent* characteristic, all of the five competencies included in the general framework proposed by Steinke (2017) should be met. Similarly, a coach's *trustworthiness* is also multifaceted as it can be related to the four "Cores of Credibility" (i.e., integrity, intent, capabilities, results; Frazier, 2020; Covey, 2006). When building trust, character (integrity and intent) comes first, however, competency (capabilities and results) plays a significant role in relationships—teachers need to be able to trust that the coach is knowledgeable in their focus area and is able to deliver as they promise (Frazier, 2020).

This alignment is similar to findings outlined by Elfarargy et al.'s (2022) study, which found that teachers value ICs who facilitate collaboration, share instructional approaches, engage them in discourse, and assist in making data-driven instructional decisions (the various alignments with Table 2 are noted). Elfarargy et al. (2022) also found that teachers believed that coaches should be responsible for fostering respect and trust among those in their PL community to develop a safe environment for them to learn. The fostering of respect and trust would also speak to a coach's *caring* and *trustworthy* characteristics.

Implications for Practice

In considering the 10 characteristics of effective ICs (Frazier, 2020) in comparison to the general coaching competency framework (Steinke, 2017), coaches must exhibit at least several (ideally all) of the characteristics in order to meet the five key competencies. Thus, educational administrators/consultants might use the 10 characteristics (Frazier, 2020) when screening candidates who will serve as coaches. As documented herein, these 10 characteristics are exhibited by effective digital technology coaches and should be considered as core competencies when considering candidates for this role.

Additionally, current coaches might consider completing reflections on their practice and self-evaluations to determine which of the characteristics they need to further develop and establish plans to do so with their support team. Coaches need to be a part of a school support team that includes the administrator(s), other coaches, and educators (Tanner et al., 2017). As Reddy et al. (2018) highlighted, there continues to be a need for evaluating coaches across instructional areas, therefore, coaches should seek feedback from their colleagues in determining those areas requiring further development. Interestingly, Reddy et al. (2018) propose the four interrelated assessment scales that cover a significant portion of these characteristics and coaching competencies. These scales might be used to assess coaching efficacy within different contexts.

Limitations and Future Research

There are several limitations of this study. First, a methodological limitation resides in the singular use of Frazier's (2020) 10 characteristics of effective instruction as the framework for data analysis—there was a lack of coding for findings that are inconsistent with this model. Given that this study examined one school district in Ontario, geographic and jurisdictional limitations exist. Furthermore, the school district and coaching staff examined in this study were fairly small. Considering that they did not have a critical mass of peers to draw on, these DTCs were spread thin. There also exists a limitation based on a lack of contextual factors (e.g., school size, technological resources), as these data were not tracked to preserve confidentiality. Despite these

limitations, the findings may still be generalizable to other contexts, particularly those where the school district sample is typical in size (student population +20,000) and, herein, we have provided a detailed description of the participants' characteristics—an affordance of qualitative research (Denzin, 1989).

Additionally, because of the fluctuating nature of school district positions, there were changes in the DTCs who were observed and their roles and responsibilities over the 4 years of this study, which resulted in a shift from observing a DTC who worked closely with secondary school teachers in varying subject areas, to observing a DTC who worked closely with elementary (kindergarten to grade eight) teachers. Of the 89 elementary teachers who were followed, only 10 were observed in more than one academic year (eight of whom were observed in two consecutive years; two of whom were observed in 3 consecutive years). Additional fluctuations in the numbers of teachers receiving coach support are seen year over year (Year 1, n = 16; Year 2, n = 25; Year 3, n = 40; Year 4, n = 20).

In the Winter 2020 term, Year 4 data collection was paused in response to the sudden and unanticipated shift to online learning as a result of the COVID-19 pandemic. Consequently, the DTCs became increasingly less available due to the growing demand for technology support from teachers. Additionally, given the uncertainty of the pandemic, researchers were no longer able to collect data or have access to the DTCs, as both the school board and the researchers' university research ethics committees placed a moratorium on research with human participants.

Future research might explore how DTCs have adjusted their practices post-COVID-19 shutdowns. In relation to the characteristics explored in this study, future research could investigate whether changes in DTC practices have altered the characteristics of an exemplary and effective DTC. To complement this, researchers might explore whether teachers' views of the characteristics that make up an impactful DTC have changed (and to what degree) during and/or post-pandemic. As well, future research could investigate if there are differences in the amount of experience and teachers' perceptions of what characterizes an exemplary coach.

Conclusion

Over the last several years, the K–12 educational system has seen many shifts in school technology and how that technology is integrated into the classroom and school districts. As a result, the role of the DTC continues to evolve and the need for effective DTCs increases. It is evident that the 10 characteristics of effective instructional coaches (ICs) that Frazier (2020) developed apply also to effective DTCs. It can further be argued that coaches who possess some level of each of these 10 characteristics, as well as a grasp of general coaching competencies (Steinke, 2017), hold the potential to be considered effective coaches—regardless of the content or curricular area they focus on.

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