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# Use of an Online Platform to Facilitate and Investigate Data-Driven Instructional Coaching

**Todd A. Glover, PhD[1], Linda A. Reddy, PhD[1], Alexander Kurz, PhD[2], and Stephen N. Elliott, PhD[2]**

**Abstract**

This article presents theoretical and empirical support for a data-driven instructional coaching approach and emerging evidence for the contributions of an online platform in operationalizing, assessing, and facilitating the implementation of key coaching actions for both research and practice. The contributions of an online platform in guiding the implementation and investigation of key coaching actions (i.e., modeling, facilitation of practice, and feedback) throughout a five-phase coaching sequence are presented. The article outlines initial research to demonstrate the utility of the online platform for advancing an understanding of how coaching actions predict teacher and student outcomes. This research suggests that there are predictive relationships between coaching actions and the fidelity of implementation of teacher interventions, reductions in instructional gaps, and student achievement. The implications of this work for advancing coaching practices and future empirical investigations are described.

**Keywords**

interventions, professional development, progress monitoring

Federal initiatives based on advances in educational science have emphasized the need to support teachers' use of assessment data to inform the implementation of research-based practices for improving student learning and behavior (e.g., Every Student Succeeds Act, 2015; Individuals with Disabilities Education Act, 2004). Such initiatives have identified school-based, job-embedded coaching as a crucial mechanism for advancing educators' application of data-driven decision making and implementation of research-based practices. However, despite the emerging popularity of coaching in schools, the empirical basis for coaching approaches and supports is limited, with few tools available for operationalizing, assessing, and facilitating a structured coaching process (e.g., Denton & Hasbrouck, 2009).

Although nearly four decades have passed since Joyce and Showers (1981) defined coaching as a collaborative relationship "characterized by an observation and feedback cycle. . . for the purpose of integrating mastered skills and strategies into a curriculum, a set of instructional goals, a time span, and a personal teaching style" (p. 170), there is no consensus today on core components for coaching. As Denton and Hasbrouck (2009) and Kurz, Reddy, and Glover (2017) have noted, the operationalization of coaching has varied widely, as defined by various coaching foci (e.g., technical support, problem solving), actions (e.g., observation, goal-setting, collaborative planning, modeling, practice, feedback), and desired outcomes (e.g., enhanced performance, environmental change, promotion of autonomy). Reflecting on research from a recent special journal issue on consultation and coaching, Erchul (2015) has recognized the importance of full operationalization and measurement of coaching as an independent variable with clearly defined components and the need to prioritize measurement of student outcomes rather than only teacher practices following coaching. Similarly, Kraft, Blazer, and Hogan (2018), in discussing the implications of a recent meta-analysis of school-based coaching, have highlighted the critical need for research evaluating specific coaching features, rather than only the efficacy of coaching programs as a whole.

Although a recent meta-analysis of 60 randomized controlled studies evaluating the impact of coaching in school-based settings provided support for the overall efficacy of coaching, with pooled effect sizes of .49 *SD* on instructional

[1]Rutgers University, Piscataway, NJ, USA
[2]Arizona State University, Tempe, USA

**Corresponding Author:**
Todd A. Glover, Rutgers University, 41 Gordon Road, Suite C, Piscataway, NJ 08854, USA.
Email: todd.glover@rutgers.edu

practices ($n = 43$) and .18 *SD* on student achievement ($n = 31$), the included studies primarily evaluated the efficacy of entire coaching models rather than relative benefits of individual coaching components. Furthermore, the majority of studies focused on early literacy and language skills (e.g., Downer, Pianta, Fan, Hamre, Mashburn, & Justice, 2011; Powell, Diamond, Burchinal, & Koehler, 2010) and elementary reading (e.g., Vernon-Feagans, Kainz, Hedrick, Ginsberg, & Amemdum, 2013), with only a handful of studies evaluating coaching in other academic areas (e.g., Garet et al., 2011) or for the development of positive student relationships (Gregory, Allen, Mikami, Hafen, & Pianta, 2014; Mikami, Gregory, Allen, Pianta, & Lun, 2011). Additional investigations of specific aspects of coaching within and across content areas are critical for advancing an understanding of the key actions required to best support teachers in meeting the needs of students (e.g., Denton & Hasbrouck, 2009; Deussen, Coskie, Robinson, & Autio, 2007; Kurz et al., 2017).

## Primary Objective of This Article

The objective of this article is to describe and provide emerging evidence for the utility of an approach for operationalizing, facilitating, and measuring coaching and its components to guide coaching implementation and research. This approach makes use of an online platform to provide structure and guidance in implementing coaching components within a data-driven instructional coaching model that holds promise with respect to its empirical support and practical utility (e.g., Glover, 2017a; Kurz et al., 2017). The article begins with a discussion of the data-driven instructional coaching model and its empirical support. Next, applications of the online platform with this coaching approach are discussed. Initial research and future directions for the use of the online platform in facilitating research and practice is then provided.

## Data-Driven Instructional Coaching

Within a data-driven instructional coaching framework, coaches support teachers in adjusting practices to meet student needs through a process of (a) identifying students' behavior/performance relative to benchmark expectations; (b) analyzing data to determine mechanisms responsible for these needs; (c) developing relevant student goals; (d) identifying and utilizing appropriate individual, group-based, or whole-classroom instructional practices/interventions to achieve those goals; and (e) monitoring implementation and students' progress to guide ongoing changes in practices. Regular scaffolding is provided to teachers in selecting, implementing, and monitoring appropriate research-based strategies based on the needs of individual students and student groups (e.g., Glover, 2017a).

Throughout the coaching process, a protocol is used to enroll teachers in key coaching actions found through empirical research to impact teacher practices and student performance: modeling, facilitated practice, and regular feedback (e.g., Glover, Reddy, & Crouse, 2018; Kurz et al., 2017). Coaches model data-based decision making and research-based practices both during and outside of class time via role-play or direct demonstrations. They offer regular opportunities for teachers to practice new skills in the classroom. Observing teachers at set intervals, they provide immediate and ongoing feedback about data-based decisions and classroom practices.

The data-driven instructional coaching model is content neutral and has been applied to support teachers in improving the academic and social-behavioral performance of students in both general and special education (e.g., Fabiano, Reddy, & Dudek, 2018; Glover, 2017). For example, coaching within this model might focus on addressing multiple data-driven academic and behavioral goals within and across teachers, such as increasing a teachers' use of behavioral praise relative to corrective feedback or supporting a teacher's implementation of a research-based phonics intervention to address difficulties with decoding for students in both regular and special education.

Given that it can be used to support teachers with whole school or classroom practices, instructional groups, and/or individualized student interventions (Glover et al., 2018), the data-driven instructional coaching model can be applied within the context of a multi-tiered system of support in addressing universal (Tier I), targeted (Tier II), and intensive (Tier III) student needs. For example, in the area of early reading, Glover and Reddy (2017) trained coaches to utilize data-driven instructional coaching to support early elementary teachers in utilizing class-wide reading screening data to guide instructional planning to improve core reading instruction when common reading needs were identified across the majority of students. To meet the needs of students performing below established reading benchmark expectations, they trained coaches to apply the model to support teachers in (a) utilizing screening and diagnostic reading data to guide the identification of appropriate interventions for small groups and individual students, (b) implementing research-based instructional practices, and (c) making ongoing alterations to intervention plans based on regular monitoring of students' progress.

### *Theoretical Foundation*

Coaching for the data-driven instructional coaching approach is designed to promote changes in teachers' practices to improve outcomes for students. It follows an extended five-phase sequence adapted from a behavioral consultation framework that has increased in popularity

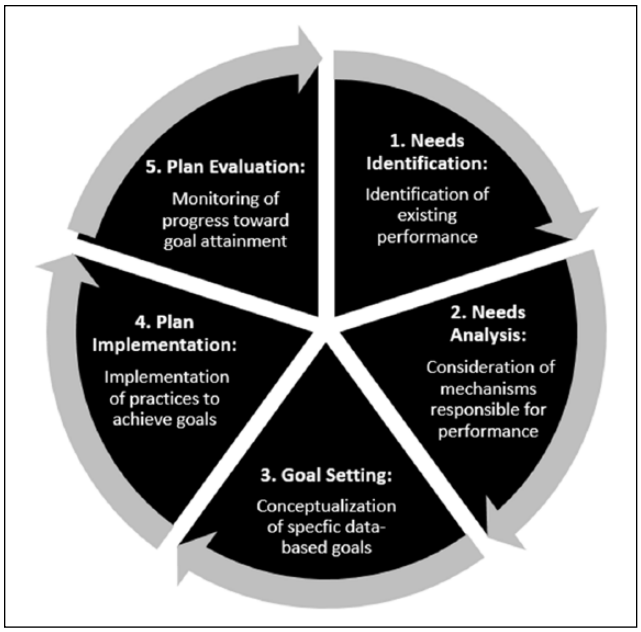


**Figure 1.** Five-phase framework for problem-solving consultation.

over the past several decades for its practical use in schools in compiling and analyzing data, developing goals and plans of action, and modifying implementation based on regular monitoring of students' progress (e.g., Bergan, 1977; Bergan & Kratochwill, 1990; Frank & Kratochwill, 2014). This framework, also known as problem-solving consultation, is shown in Figure 1.

Grounded in social learning theory and behavioral theory (e.g., Bandura, 1977; Kratochwill, Elliott, & Callan-Stoiber, 2002), behavioral or problem-solving consultation considers relationships between behaviors and environmental conditions and the use of modeling, support, and feedback to the consultee to promote his or her confidence in performing tasks/skills and positive perceptions about importance of goals or practices (Glover, 2017a). Consistent with this approach, the learning environment is the primary emphasis of a data-driven coaching approach, rather than fixed traits of students or teachers. Through modeling, guided practice, and regular feedback, teachers receive ongoing support in adapting instruction/intervention based on regularly assessed student skill needs.

Development of the data-driven instructional coaching model has also been informed by an evidence-based theoretical framework of adult behavior change from the area of health psychology known as the Health Action Process Approach (Schwarzer, 2008). Within this framework, behavior change occurs as a result of mechanisms operating during a motivational phase impacting a person's intentions and a volitional phase during which intentions are transformed into actions (e.g., Sanetti, Kratochwill, & Long, 2013; Schwarzer, 2008). In accordance with this framework, instructional coaches support teachers in managing outcome expectancies, their self-efficacy with regard to the implementation of practices, and their perceptions about the utility of engaging in behavior change. By guiding teachers through action planning and helping them to address potential barriers to implementation, coaches facilitate teachers' commitment to engaging in practice recommendations. Teachers' intention to implement and implementation sustainability are reinforced by coaches' modeling, role-play, and provision of feedback in response to practice (Glover, 2017).

## *Empirical Support for Data-Driven Instructional Coaching*

Empirical support for a data-driven coaching approach is based on decades of behavioral consultation investigations and more recent full-scale evaluations of the coaching model itself. Across these studies, common components have included the use of data to drive goals and plans of action, implementation of modeling and practice opportunities to support teachers' implementation of interventions, and regular monitoring of implementation and progress toward goals to adjust action plans. Evaluating the efficacy of consultation or coaching implementation as a whole, existing research has found strong effects on teacher practices and student outcomes (e.g., Glover, 2017a; Sheridan, Bovaird, Glover, Garbacz, Witte, & Kwon, 2012). Although there is an emerging database of evidence of the efficacy of a data-driven coaching approach, further investigations of the influence of specific aspects of coaching (e.g., modeling, practice, or feedback) are needed to advance the science on coaching implementation.

A large database of single-case design studies and methodologically rigorous group experimental studies has demonstrated strong effects for the impact of behavioral or problem-solving consultation on teacher practices and student behavior and social skills (e.g., Sheridan et al., 2012; Sheridan, Clarke, & Ransom, 2014; Sheridan, Welch, & Orme, 1996). For example, Sheridan et al. (1996), in reviewing consultation research from 1985 to 1995, found that among the 25 behavioral consultation studies reviewed, 95% reported at least one positive consultee and/or student outcome. Sheridan and colleagues (e.g., Sheridan et al., 2012; Sheridan et al., 2017) have conducted multiple large-scale randomized controlled trials of a behavioral consultation approach designed to meet the needs of early elementary school students with or at risk for Serious Emotional Disturbance or Disruptive Behavior Disorders. These investigations have evaluated structured, protocol-driven support for teachers and parents in (a) identifying students' needs, (b) evaluating the functions of student behaviors, (c) developing intervention plans, (d) implementing strategies with fidelity, and (e) evaluating progress to guide adjustments to behavioral management strategies. Results from this

research have indicated greater positive changes in observed student classroom behaviors (e.g., $d = 0.28$-$0.46$), adaptive behaviors (e.g., $d = 0.46$-$0.47$, for teacher ratings on the Social Skills Assessment System, Gresham & Elliott, 1990), reduced school problems (e.g., $d = -0.45$, for teacher ratings on the Behavior Assessment System for Children−2; Reynolds & Kamphaus, 2004), and improved parent–teacher relationships (e.g., $d = 0.46$-$0.47$, for teacher ratings on the Parent-Teacher Relationship Scale; Vickers & Minke, 1995) for those assigned to the consultation condition relative to controls (Sheridan et al., 2012; Sheridan et al., 2017).

Hasbrouck (2017) has also investigated the use of a four-phase consultation-based problem-solving coaching approach in the area of early reading whereby the coach works with teachers to (a) collect and review data to guide teachers' sense and vision of a problem and analyze mechanisms responsible for the problem, (b) set observable and measurable goals, (c) support the teacher in implementing an implementation plan, and (d) work with teachers to determine whether goals are achieved and next steps for implementation. Key components of Hasbrouck and Denton's model have been empirically investigated in studies preceding its development and have resulted in positive outcomes with respect to teacher practices and student reading outcomes (e.g., Hasbrouck, 1991; Hasbrouck & Garrison, 1990; Hughes, Hasbrouck, Serdahl, Heidgerken, & McHaney, 2001; Tindal, Parker, & Hasbrouk, 1992).

Other rigorous randomized controlled trials have directly evaluated the impact of data-driven coaching approaches on teacher practices and student outcomes. For example, Reddy and colleagues (Fabiano et al., 2018; Reddy et al., 2017) evaluated the impact of a data-driven coaching approach that targeted 89 elementary teachers' class-wide instructional and behavioral management practices. Coaches supported teachers during 30-min coaching sessions in (a) using assessment data to identify gaps in instructional and behavioral management practices, (b) setting goals to address these gaps; (c) designing and implementing plans of action that included specific classroom strategies, and (d) using visual performance data to track progress and make strategy adjustments. Coaching included facilitating teachers' use of instructional and behavioral management data from the Classroom Strategies Assessment System (CSAS; Reddy & Dudek, 2014) to guide their practice, modeling of instructional and behavioral management strategies, providing opportunities for teachers to practice, and using visual performance feedback to guide ongoing changes to instructional strategy implementation. Results from this research indicated high levels of coaching fidelity and acceptability. Relative to control participants, teachers who received coaching demonstrated statistically greater improvements in observed behavior management practices ($d = 0.54$), and self-reported instructional ($d = 0.45$) and behavioral management practices ($d = 0.41$).

Rigorous research for which peer-reviewed manuscripts are currently in submission also provides support for a data-driven coaching approach in the area of early reading. For example, in a large-scale study conducted in 53 school districts, Glover, Ihlo, Shapiro, and their colleagues (e.g., Glover, 2017a, 2017b) examined the effects of professional development with regular coaching in data-driven early reading interventions on classroom practices and reading outcomes for 1,719 K–3 students at risk for and with significant reading difficulties. Coaching of 207 classroom teachers and 182 interventionists focused on (a) analyzing students' early reading performance relative to performance benchmarks, (b) identifying mechanisms responsible for this performance, (c) developing reading goals, (d) selecting and implementing research-based group interventions to achieve these goals, and (e) monitoring students' progress to inform ongoing intervention provision. Coaching included modeling of data-based decisions and interventions, facilitation of opportunities for teachers to practice implementation, and development of regular oral and written feedback. Results from this study indicated that, relative to controls, (a) coached teachers and interventionists had greater increases in their self-efficacy ($d = 0.77$ for teachers; $d = 0.89$ for interventionists), knowledge ($d = 0.52$ for teachers; $d = 0.37$ for interventionists), and classroom practices ($d = 2.56$ for teachers; $d = 2.38$ for interventionists) and (b) students in coached teachers' classrooms exhibited higher performance on measures of alphabetic principal ($d = 0.19$), phonics ($d = 0.36$-$0.80$), and fluency ($d = 0.21$-$0.48$).

Thus, a growing body of evidence supports the efficacy of the data-driven coaching approach as a whole (Glover, 2017a). However, as with any coaching approach, further research on the influence of specific aspects of coaching (e.g., modeling or the provision of feedback; coaching applications at various tiers of service delivery) is needed to advance the science on coaching implementation. In addition, practitioner-friendly tools are needed to facilitate the application of this coaching model in schools outside of large-scale, resource-intensive research studies. The recent evolution of an online platform used to guide coaching has helped in this regard by facilitating standardization of the model and monitoring of its implementation, and by providing a means of collecting and coding information necessary to investigate specific coaching components in routine educational practice.

## Use of an Online Platform to Facilitate and Investigate Data-Driven Instructional Coaching

Even when a specific coaching approach has been defined clearly, implementation of the coaching process has been found to differ substantially when applied in schools (Deussen et al., 2007; Kurz et al., 2017; Neufeld & Roper,

2003; Russo, 2004). As noted by Denton and Hasbrouck (2009), teachers' practical knowledge and experience in utilizing data to make instructional decision varies widely, with most teachers receiving little formalized training. Denton and Hasbrouck further highlight teachers' need for ongoing support in selecting and implementing specific interventions based on students' needs. Although coaching in large-scale research studies is conducted by staff trained via structured protocols, practitioner-friendly tools are needed to guide the application, measurement, and investigation of coaching outside of these settings.

A unique factor in advancing research and practical applications of the data-driven coaching approach has been the development and use of an online coaching platform. The use of this platform has been instrumental in facilitating the coaching process among instructional coaches and their teachers in school settings. Importantly, it has also provided the necessary structure to obtain data to investigate the implementation of individual coaching components and their inter-relationships and contributions to teacher and student outcomes (Glover & Reddy, 2017).

The online platform developed for the data-driven coaching approach helps to address the research to practice gap by enabling coaches and their teachers to navigate through each of the five phases depicted in Figure 1: identifying needs relative to benchmarks, analyzing data to determine mechanisms responsible for these needs, developing relevant goals, implementing a plan to achieve these goals, and monitoring and evaluating implementation and progress toward goals. The online platform increases the efficiency of interactions between coaches and teachers by providing a structure for coaching. It is used during coaching sessions to gather and organize information necessary to inform teacher practice. Outside of face-to-face interactions, it enables both coaches and teachers to engage in preplanning and follow-up activities. The online platform helps to promote active communication and collaboration between coaches and their teachers through regular sharing of observations, notes, feedback, and directions. Importantly, data collected within the platform can be used both to guide and evaluate the coaching process and to answer important research questions about relationships among coaching actions and teacher and student outcomes.

## *Structured Process*

Use of the platform begins with a structured process for facilitating coaches' and teachers' identification of data-based needs. This helps to support school personnel who value data-driven decisions but have varying experience in selecting and utilizing appropriate sources of data. By guiding the users through available data sources within specific content domains (e.g., academic skills, social emotional learning, or behavioral concerns) and allowing for customization of assessments based on school needs, the online platform provides a flexible structure to aid with identifying student behavior or academic performance concerns that warrant teacher support.

Given that data-driven coaching can be used to support teachers with whole school or classroom practices, instructional groups, and/or individualized student interventions (Glover et al., 2018), coaching cases can be assigned within the online platform to individual teachers, groups of teachers, or school teams. This helps to facilitate goal setting and action planning among stakeholders involved in multiple tiers of student support. For example, coaching to address universal instructional needs might involve grade-level instructional team members, while coaching for a specific intensive student need might involve a single teacher. By creating a structure for establishing coaching cases, the online framework aids in planning for the involvement of specific stakeholders in the coaching process.

Grounded in behavioral consultation (Bergan & Kratochwill, 1990; Frank & Kratochwill, 2014), data-driven instructional coaching focuses on the use of specific, measurable, and time-bound goals for guiding intervention planning. The coaching platform helps to facilitate the development of well-designed goals by guiding coaches and teachers in considering baseline student performance or behavior, targets for improvement based on students' needs, and a timeframe for conducting intervention. Completion of required information online generates appropriate goals tailored to specific coaching cases.

As noted by Denton and Hasbrouck (2009), utilizing student data to guide instructional and intervention planning can be difficult for school staff. It requires knowledge and skills in the application of data-based decision rules, the implementation of interventions and their components, and the coordination of personnel and material resources. The online platform assists coaches and teachers in selecting from existing interventions or customizing interventions based on identified student needs. For each coaching case, users select interventions from a set of common interventions organized by targets within content domains (e.g., academic skills, social emotional learning, or behavioral concerns) within the platform or utilize planning tools to create action steps for customized approaches. To clarify roles and responsibilities, users also specify the involvement of personnel in implementing intervention plan steps.

Teachers' intention to implement interventions and sustain implementation across time and contexts, as defined by a Health Action Process behavioral change framework (Schwarzer, 2008), is reinforced within the coaching platform by prompts for coaches to engage in modeling, role-play, and provision of feedback in response to teachers' practice (Glover, 2017). Logging and online chats within the platform enable coaches and teachers to summarize and follow-up about specific data-based decisions and instructional practices and to formalize action steps throughout the coaching process.

Progress monitoring and evaluation of intervention implementation are core components of the instructional/intervention decision-making process that require coaches and teachers to systematically record data and apply decision rules about student progress (Denton & Hasbrouck, 2009). To assistant coaches and teachers in monitoring implementation and student progress in response to intervention, the online platform prompts coaches and teachers regularly (e.g., weekly, bi-weekly) to log intervention implementation via observation or self-report checklists and to enter performance or behavioral data to gauge progress toward goals. The platform enables coaches and teachers to review progress via visual performance feedback graphs and accompanying summary notes to guide decisions about the next path of action for intervention (i.e., continue intervention, retrain in intervention, revise or replace intervention, or discontinue work toward their goal) based on analysis of their data. The platform then guides users to the next logical action path (e.g., continued, progress monitoring, development of a new intervention, etc.) in the coaching process.

Finally, coaching is a complex, and at times lengthy, process that requires coordination of numerous tasks to develop and achieve goals across multiple coaching cases. To guide planning for the coaching process, a progress bar and interactive calendaring component of the online platform enable users to view their progress within the process of coaching and to plan for coaching steps and face-to-face meetings. This helps coaches in managing their case load in working with teachers with varying needs.

### *Practical and Ethical Considerations*

Several practical and ethical considerations are important to highlight for the online platform developed for the data-driven coaching approach. First, effective use of the platform is limited by the knowledge and expertise of users. Training on both the coaching model and platform functions has been provided via grant-funded research projects (e.g., Glover et al., 2018). Second, although the platform has been developed to guide and collect information on the implementation of specific coaching components, the practical benefits afforded to teachers and students are limited by the selection and implementation of appropriate interventions. Third, the platform has been designed to be used in a non-evaluative, collaborative environment; however, the interpersonal interactions between coaches and teachers may influence teachers' responsiveness to coaching and subsequent intended outcomes. Finally, although the password-protected platform is designed to maintain confidentiality for users, safeguards have been utilized via grant-funded projects to inform users about any use of the data and their rights.

### *Example Platform*

Although multiple iterations of an online platform have been used to facilitate and investigate data-driven instructional coaching, ReadyCoach, developed by Glover, Reddy, Kurz, and Elliott (2017), has been designed specifically to guide coaches and teachers and collect data corresponding to coaching actions (e.g., modeling, facilitating practice opportunities, and providing feedback), processes (i.e., identifying needs relative to benchmarks, analyzing data to determine mechanisms responsible for these needs, developing relevant goals, implementing a plan to achieve these goals, and monitoring and evaluating implementation and progress toward goals), and outcomes (e.g., teacher practices and student performance) associated with this approach. Screenshots corresponding to coaches' use of a platform in identifying students' needs, logging intervention implementation, and evaluating progress toward goals are displayed in Figure 2.

## Emerging Evidence and Future Directions for Utilizing an Online Coaching Platform to Advance Coaching Research

Use of an online platform such as ReadyCoach has been instrumental in advancing investigations of relationships among coaching components and their potential contributions to teacher and student outcomes. As highlighted, there have been only limited investigations of the contributions of individual coaching components (Denton & Hasbrouck, 2009; Deussen et al., 2007; Kurz et al., 2017). Additional work is needed to advance an understanding of which coaching components are most critical and the mechanisms by which these components influence intended coaching outcomes. Although in its infancy, initial research on key coaching components has focused primarily on elements of coaching that are common across coaching models, such as modeling, facilitated practice, and ongoing teacher feedback (Kurz et al., 2017).

As part of a large-scale initiative, Glover and Reddy (2017) investigated relationships between coaching actions (i.e., modeling, facilitated practice, and feedback) and the fidelity and quality of teachers' intervention implementation and need for instructional improvement in the classroom. They trained 25 coaches from 14 high poverty schools to implement each phase of the data-driven instructional coaching model with a case load of approximately 12 teachers. They provided regular consultation and workshop-based trainings during the summer and throughout the academic school year to support coaches' work in schools. ReadyCoach enabled data collection on (a) the dosage of coaching actions throughout the coaching process, (b) teachers' intervention

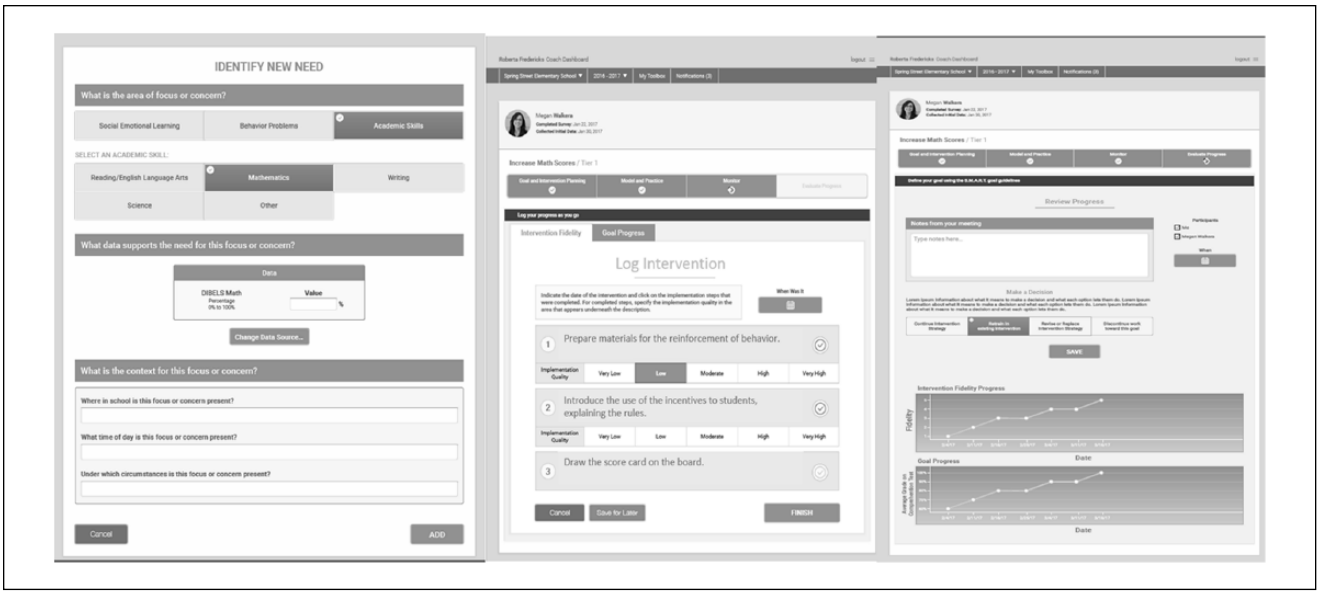


**Figure 2.** Screenshots of coaching platform.

fidelity (observed percentage of completed intervention steps) and quality (observed ratings of the quality of implementation), and (c) reductions in gaps in teacher instruction (discrepancies between the observed and desired quality of instructional and behavioral management practices as measured by the CSAS, Reddy & Dudek, 2014). Initial findings from this study reported in a manuscript currently in submission indicate that reductions in the instructional gap in teachers' classrooms were predicted by facilitation of teacher practice ($\beta = -2.13, p < .05$) and feedback ($\beta = -1.44, p < .05$). In addition, facilitation of teacher practice also predicted fidelity ($\beta = .05, p < .001$) and quality ($\beta = .07, p < .001$) of teachers' intervention implementation. Furthermore, the quality of intervention implementation mediated the relationship between facilitated practice and reductions in the instructional gap. These important findings underscore the potential importance of modeling and feedback for improving the instructional environment . They also highlight the role of intervention implementation as a mechanism for influencing positive change.

Given the importance of examining the effect of coaching on the outcomes of students in coached-teachers' classrooms, Glover et al. (2018) conducted a follow-up study with the same sample of 25 coaches from 14 high poverty local education agencies (LEAs) investigating the impact of coaching actions (i.e., modeling, facilitated practice, and feedback) on student achievement. They utilized data collected from ReadyCoach on the dosage of coaching actions throughout the coaching process and mean end-of-year achievement scores in math and English language arts (ELA) on the Measures of Academic Progress (MAP; Northwest Evaluation Association, 2011) and the Partnership for Assessment of Readiness for College and Career (PARCC) assessments from coached-teachers' classrooms. Among other key findings reported in a manuscript in submission, end-of-year mean MAP Rausch Unit (RIT) scores were predicted by modeling (for ELA, $\beta = 7.07, p = .03$; for math, $\beta = 9.89, p = .01$) and facilitation of teacher practice (for ELA, $\beta = 6.94, p = .03$; for math, $\beta = 7.50, p = .02$). Results also indicated that end-of-year mean PARCC proficiency scores were predicted by modeling (for ELA, $\beta = 16.29, p < .001$; for math, $\beta = 6.80, p = .04$) and facilitation of teacher practice during coaching (for ELA, $\beta = 14.84, p < .001$; for math, $\beta = 9.96, p < .001$). Such findings provide evidence in support of the utility of specific coaching actions in ultimately improving student performance.

Beyond this initial research, utilization of an online platform to collect meaningful data on coaching actions, processes, and outcomes has utility in advancing investigations of common aspects of coaching across contexts. This can expand the knowledge base on coaching by advancing an understanding of interrelationships among components of coaching and teacher practices and student outcomes. Although recent research has yielded promising findings (e.g., Glover & Reddy, 2017; Glover et al., 2018), additional investigations are needed to determine how coaching actions may influence outcomes in various contexts (e.g., learning new instructional techniques, generalizing existing skills to new content domains, instituting systems change). Additional research is also needed to explore the influence of other potential coaching components (e.g., use of annotated examples during coaching) as well as the optimal conditions under which coaching is effective. The regular use

of an online platform will be instrumental for advancing this work across various settings and content domains. This work is important for informing which aspects of coaching to utilize under which conditions in the field.

## Conclusion

The present article provides a brief synopsis of emerging research in data-driven instructional coaching and contributions of an online platform in structuring and facilitating the implementation of coaching and investigation of the key coaching components, processes, and outcomes. By highlighting school-based applications of this platform and initial research and future directions for its use, it is hoped that this article will advance considerations about school-based coaching research and the meaningful use of technology-based solutions to guide coaching practices.

### Authors' Note

The positions and opinions expressed in this article are solely those of the authors.

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### ORCID iDs

Todd A. Glover https://orcid.org/0000-0001-7100-8139
Linda A. Reddy https://orcid.org/0000-0001-8314-2810

### References

Bandura, A. (1977). *Social learning theory*. Oxford, UK: Prentice Hall.

Bergan, J. R. (1977). *Behavioral consultation*. Columbus, OH: Merrill.

Bergan, J. R., & Kratochwill, T. R. (1990). *Behavioral consultation and therapy*. New York, NY: Plenum Press.

Denton, C. A., & Hasbrouck, J. E. (2009). A description of instructional coaching and its relationship to consultation. *Journal of Educational and Psychological Consultation*, *19*, 150–175. doi:10.1080/10474410802463296

Deussen, T., Coskie, T., Robinson, L., & Autio, E. (2007). *"Coach" can mean many things: Five categories of literacy coaches in reading first* (Issues & answers report, REL 2007–No. 005). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northwest. Retrieved from http://ies.ed.gov/ncee/edlabs

Downer, J. T., Pianta, R. C., Fan, X., Hamre, B. K., Mashburn, A., & Justice, L. (2011). Effects of w-mediated teacher professional development on the language and literacy skills of children enrolled in prekindergarten programs. *NHSA Dialog*, *14*, 189–212. doi:10.1080/15240754.2011.613129

Erchul, W. P. (2015). Put me in, coach: Observations on selected studies implementing supportive interventions to teachers. *School Mental Health*, *7*, 74–79.

Every Student Succeeds Act, 20 U.S.C. § 1 *et seq*. (2015).

Fabiano, G., Reddy, L. A., & Dudek, C. M. (2018). Teacher coaching supported by formative assessment for improving classroom practices. *School Psychology Quarterly*, *33*, 293–304. doi:10.1037/spq0000223

Frank, J. L., & Kratochwill, T. R. (2014). School-based problem-solving consultation: Plotting a new course for evidence-based research and practice in consultation. In W.P. Erchul & S.M. Sheridan (Eds.), *Handbook of research in school consultation* (2nd ed., pp. 18–42). New York, NY: Routledge.

Garet, M., Wayne, A., Stancavage, F., Taylor, J., Eaton, M., Walters, K., . . . Doolittle, F. (2011). *Middle school mathematics professional development impact study: Findings after the second year of implementation* (NCEE 2011-4024). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance.

Glover, T. A. (2017). A data-driven coaching model used to promote students' response to early reading intervention. *Theory Into Practice*, *56*(1), 13–20. doi:10.1080/00405841.2016.1260401

Glover, T.A., Reddy, L.A., Kurz, A., & Elliott, S.N. (2017). *ReadyCoach*. Westfield, NJ: iCoach Learning Innovations.

Glover, T. A. (2017b). Investigating teacher professional development with distance coaching to promote students' response to reading interventions in rural schools. In G. C. Nugent, G. M. Kunz, S. M. Sheridan, T. A. Glover & L. L. Knoche (Eds.), *Rural education research in the United States* (pp. 167–179). New York, NY: Springer. doi:10.1007/978-3-319-42940-3_9

Glover, T. A., & Reddy, L. A. (2017, February). *Instructional coaching components that predict improved teacher and student outcomes*. Paper presented at the Annual Meeting of the National Association of School Psychologists, San Antonio, TX.

Glover, T. A., Reddy, L. A., & Crouse, K. (2018, February). *Vital components of instructional coaching that predict student achievement*. Paper Presented at the Annual Meeting of the National Association of School Psychologists, Chicago, IL.

Gregory, A., Allen, J. P., Mikami, A., Hafen, C. A., Pianta, R. C. (2014). The effectiveness of a teacher professional development program in reducing the racial disparity in classroom discipline referrals. In Losen, D. J. (Ed.), *Closing the school discipline gap: Equitable remedies for excessive exclusion* (pp. 166–179). New York, NY: Teachers College Press.

Gresham, F. M., & Elliott, S. N. (1990). *Social skills rating system*. Minneapolis, MN: NCS Pearson.

Hasbrouck, J. E. (2017). Student-focused coaching. *Theory Into Practice*, *56*(1), 21–28.

Hasbrouck, J. E. (1991, April). *Solving problems through responsive consultation: A strategy that works!* Paper presented at the Meeting of the Council for Exceptional Children, Atlanta, GA.

Hasbrouck, J. E., & Garrison, M. (1990, October). *Responsive consultation for solving classroom-based concerns*. Paper Presented at the Meeting of the Council for Learning Disabilities, Austin, TX.

Hughes, J. N., Hasbrouck, J. E., Serdahl, E., Heidgerken, A., & McHaney, L. (2001). Responsive systems consultation: A preliminary evaluation of implementation and outcomes. *Journal of Educational and Psychological Consultation*, *12*, 179–201. doi:10.1207/S1532768XJEPC1203_01

Individuals with Disabilities Education Improvement Act, 20 U.S.C. § 1400 *et seq*. (2004).

Joyce, B., & Showers, B. (1981). Transfer of training: The contribution of coaching. *Journal of Education*, *163*, 163–172.

Kraft, M. A., Blazar, D., & Hogan, D. (2018). The effect of teacher coaching on instruction and achievement: A meta-analysis of the causal evidence. *Review of Educational Research*, *88*, 547–588.

Kratochwill, T. R., Elliott, S. N., & Callan-Stoiber, K. (2002). Best practices in school-based problem-solving consultation. In A. Thomas & J. Grimes (Eds.), *Best practices in school psychology IV* (pp. 583–608). Washington, DC: National Association of School Psychologists.

Kurz, A., Reddy, L. A., & Glover, T. A. (2017). A multidisciplinary framework of instructional coaching. *Theory Into Practice*, *56*, 66–77. doi:10.1080/00405841.2016.1260404

Mikami, A. Y., Gregory, A., Allen, J. P., Pianta, R. C., & Lun, J. (2011). Effects of a teacher professional development intervention on peer relationships in secondary classrooms. *School Psychology Review*, *40*, 367–385.

Neufeld, B. and Roper, D. (2003). *Coaching: A strategy for developing instructional capacity*. Cambridge: Education Matters, Inc.

Northwest Evaluation Association. (2011). *2011 normative data*. Retrieved from https://www.nwea.org/content/uploads/2014/07/MAP-Normative-Data-One-Sheet-Dec11.pdf

Powell, D. R., Diamond, K. E., Burchinal, M. R., & Koehler, M. J. (2010). Effects of an early literacy professional development intervention on head start teachers and children. *Journal of Educational Psychology*, *102*, 299–312. doi:10.1037/a0017763

Reddy, L. A., & Dudek, C. M. (2014). Teacher progress monitoring of instructional and behavioral management practices: An evidence-based approach to improving classroom practices. *International Journal of School & Educational Psychology*, *2*, 71–84.

Reddy, L. A., Dudek, C. M., & Lekwa, A. (2017). Classroom strategies coaching model: Integration of formative assessment and instructional coaching. *Theory Into Practice*, *56*, 46–55. doi:10.1080/00405841.2016.1241944

Reynolds, C. R., & Kamphaus, R. W. (2004). *Behavior assessment system for children* (2nd ed.). Minneapolis, MN: NCS Pearson

Russo, A. (2004). School-based coaching: A revolution in professional development—or just the latest fad? *Harvard Education Letter*, 20(4), 1–4.

Sanetti, L. M. H., Kratochwill, T. R., & Long, A. C. J. (2013). Applying adult behavior change theory to support mediator-based intervention implementation. *School Psychology Quarterly*, *28*, 47–62. doi:10.1037/spq0000007

Schwarzer, R. (2008). Modeling health behavior change: How to predict and modify the adoption and maintenance of health behaviors. *Applied Psychology*, *57*, 1–29. doi:10.1111/j.1464-0597.2007.00325.x

Sheridan, S. M., Bovaird, J. A., Glover, T. A., Garbacz, S. A., Witte, A. & Kwon, K. (2012). A randomized trial examining the effects of conjoint behavioral consultation and the mediating role of the parent-teacher relationship. *School Psychology Review*, *41*(1), 23–46.

Sheridan, S. M., Clarke, B. L., & Ransom, K. A. (2014). The past, present, and future of conjoint behavioral consultation research. In B. P. Erchul & S. M. Sheridan (Eds.), *Handbook of research in school consultation* (2nd ed., pp. 210–247). New York, NY: Routledge.

Sheridan, S. M., Welch, M., & Orme, S. F. (1996). Is consultation effective? A review of outcome research. *Remedial and Special Education*, *17*, 341–354. doi:10.1177/074193259601700605

Sheridan, S. M., Witte, A. L., Holmes, S. R., Coutts, M. J., Dent, A. L., Kunz, G. M., & Wu, C. (2017). A randomized trial examining the effects of conjoint behavioral consultation in rural schools: Student outcomes and the mediating role of the teacher–parent relationship. *Journal of School Psychology*, *61*, 33–53. doi:10.1016/j.jsp.2016.12.002

Tindal, G., Parker, R., & Hasbrouk, J. E. (1992). The construct validity of stages and activities in the consultation process. *Journal of Educational and Psychological Consultation*, *3*, 99–118. doi:10.1207/s1532768xjepc0302_2

Vernon-Feagans, L., Kainz, K., Hedrick, A., Ginsberg, M., & Amendum, S. (2013). Live webcam coaching to help early elementary classroom teachers provide effective literacy instruction for struggling readers: The Targeted Reading Intervention. *Journal of Educational Psychology*, *105*, 1175–1187. doi:10.1037/a0032143

Vickers, H. S., & Minke, K. M. (1995). Exploring parent-teacher relationships: Joining and communication to others. *School Psychology Quarterly, 10*(2), 133–150.