Promoting Literacy with Teacher Knowledge in Analyzing and Using Student Data: A Review of Literature

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Abstract

The concept of data based decision making has been in the forefront of educational reform for decades. Despite the fact that data could better inform the educational decisions teachers make, some educators lack understanding of data and assessment. This could lead to misinterpretation and poor use of the scores. The purpose of this literature review is to learn more about English language arts (ELA) and literacy teachers' current practices and experiences in using assessment data to shape their literacy instruction and to learn more about their perceptions of how this assessment data should be used to shape classroom instruction. This literature review will describe five themes: (a) school leaders and teachers' level of understanding related to interpreting assessment results, (b) use of data types having different applications for school, (c) data collection methods schools employ, (d) the process of utilizing the data, and (e) creating a data culture within school. Finally, possible ideas about the future areas of research are shared.

Keywords

data, assessment, literacy, data culture, data-driven decision making

Introduction

The notion that decisions will be based on data rather than intuition is known as data-driven decision making. This concept has been in the forefront of educational reform for decades (Datnow, Greene, & Gannon-Slater, 2017). Lai and Schildkamp (2016) have deduced that data use arrives from two, sometimes-counteractive, motivations or agendas. One agenda wishes to hold teachers, administrators, and schools accountable and is associated with top-down, external accountability, and high-stakes testing. The other agenda uses assessment as a vehicle of teacher inquiry, which is associated with bottom-up, internal accountability, and low-stakes testing. As reported by Lai and Schildkamp (2016), teachers often have to balance these two competing agendas simultaneously. Kim et al. (2016) solidify this conclusion by stating that teachers use student assessment data for a wide range of purposes, from planning everyday lessons to making school-level programming decisions found in reading and English language development. The authors suggest that despite the fact that data would better inform the educational decisions teachers make, some educators lacked understanding of certain technical terms (e.g., scale score, confidence band), which could lead to misinterpretation and poor use of the scores.

Significance

As key provisions of previous educational policies such as No Child Left Behind of 2001 and the more recently passed Every Student Succeeds Act of 2015 show, closing the achievement gap for all students is a high priority for school districts and educators. Because of the emphasis on data analysis as an indicator of the level of success in teaching and learning, it is important for teachers to be able to interpret data results and make appropriate teaching decisions based on these interpretations. Darling-Hammond (2015) concluded that professional support and development is the most effective method schools have to help improve teachers' knowledge and use of student data.

The purpose of this literature review is to (1) learn more about English language arts (ELA) and literacy teachers' current practices and experiences in using assessment data to shape their

literacy instruction and (2) learn more about their perceptions of how this assessment data should be used to shape classroom instruction. Park and Datnow (2017) report that little is known about how teachers use data for instructional decision-making despite data-driven decision making being an ever-present part of policy and school reform efforts. Teachers do not appear to have much background knowledge in using assessment data. The importance of understanding teachers' perceptions was underscored by Desimone and Garet (2016), who concluded that changing teaching behaviors in a classroom is easier than improving teachers' content knowledge.

Background Literature

When reviewing current literature, it is clear that there is a demand and need for school leadership and teachers to be better informed in order to use student data more effectively. This literature review will describe five themes found: (a) school leaders and teachers' level of understanding related to interpreting assessment results, (b) use of data types having different applications for school, (c) data collection methods schools employ, (d) the process of utilizing the data, and (e) creating a data culture within school. Finally, possible ideas about the future areas of research are given.

Limited knowledge of assessment

Several studies have explored teachers' knowledge of assessment fundamentals such as validity and reliability, and have generally concluded that most teachers have little understanding of these principles (Avargil, Herscovitz, & Dori, 2012; Gotch & French, 2014; Malone, 2013; Mandinach & Gummer, 2013; Newman & Newman, 2013). Mandinach and Gummer (2013) examined building of human capacity around data use and the growing need for data-driven decision-making in programs in teacher preparation programs in schools of education. The researchers concluded that more studies are required to fully understand data literacy preparation for teachers as opposed to administrators and that support from stakeholders and policymakers is required.

Teachers not only face assessment challenges, but also can encounter difficulties when adjusting to the teaching of higher order thinking skills and new curricula. Avargil et al. (2012) conducted a study that focused on identifying teachers' challenges and difficulties when adjusting their perceptions to educational reform's new curricula. This is important to the theme of assessment knowledge because many times if teachers do not fully understand the curriculum, assessments are not effectively utilized, and student assessment data could be skewed as a result. Other challenges teachers faced were related to teaching using real-life examples so that students learn through the actual, practical experience with a subject instead of just theoretical parts, applying understanding levels, developing students' thinking skills, and assessing students' content knowledge and thinking skills. The researchers concluded that a critical success factor in using new curricula was continuous support for teachers. The authors also noted that in order for various components of pedagogical-content knowledge to evolve, teaching must be accompanied with the support of PD. In addition to PD, ongoing relationships between the teachers and the developers of curriculum were also found to be critical in the content, pedagogical, and emotional aspects. Assessment knowledge was the most difficult challenge the teachers had to face. The researchers proposed that assignments designed by teachers be used as an instrument for determining the professional growth stage of the teachers. This outcome highlights the need for increased work on assessment literacy measures in the educational measurement field.

Gotch and French (2014) systematically reviewed teacher assessment literacy measures within the context of current teacher evaluation policies from 1991 to 2012. Assessments such as objective tests, teacher reports of assessment competence, and rubrics evaluating teachers' work

were reviewed and then were compared to claims and criteria made on teacher evaluations to judge the relevance of the assessments to the teachers. Across the 36 difference assessment measures within the 50 reviewed, Gotch and French (2014) found that evidence available to support assessment literacy for these claims were weak.

Assessment knowledge

Many schools have implemented intervention frameworks such as Response to Intervention or Multiple Tiered Support Systems to help student growth in reading, mathematics, and behavior. These intervention frameworks strive to have foundational education in place before students fall behind academically, and continually use data to help create student plans for academic improvement. Algozzine et al. (2012) studied the effects of three-tiered interventions in seven urban elementary schools. Continuous professional development (PD) was provided to support the interventions. School-level workshops introduced the overall focus of the framework. District staff and faculty took part in the first year of intervention PD. Individual sessions, small group refresher workshops, and ongoing monitoring were provided for each participating school. The authors concluded that stakeholder buy-in and social validity alone are not sufficient to guarantee successful implementation of a program. Additionally, the researchers found that systematic evaluation and adapting interventions on an ongoing basis is essential to securing adherence to general principles such as expectations of behaviors rather than specific practices. Positive outcomes were maintained longer when teachers and staff made specific efforts to promote fidelity.

As more literacy and ELA teachers are explicit in their teaching and clear in their objectives, one key to making well-informed decisions regarding instruction is to gather as much valid information from assessments as possible. Murphy and Holme (2014) used a rubric for assigning complexity to gauge students' achievement toward learning objectives in general chemistry. The study confirmed that better assessment analysis is paramount to effective instructional design. Though the authors stated that using student assessment data to make informed decisions about what students know is an important factor of instructional design, this study also mentioned that utilizing assessment data can extend into judgments about programs through programmatic assessment. Essentially, a better understanding of students' academic performance goes hand in hand with the improvement of teaching practices.

One method to better decipher students' academic performance is assessing student understanding using rubrics. Atkinson and Lim (2013) created a rubric and automated it through a learning management system (LMS) in order to measure the effectiveness of assessment structure, feedback, and efficiency. The aim was to provide formative assessment feedback for the students. When given clear objectives and the ability to see what gains they have made, the students learned what they needed to do to improve their outcome and satisfaction. Howley, Howley, Henning, Gilla, and Weade (2013) studied teachers' assessment knowledge, the culture surrounding assessments in schools, and teachers' perceptions of the assessment literacy of other key stakeholders. The authors found shared practices of formative assessments to guide instruction and a reliance on collaboration in cultivating school-wide assessment practices. The authors also found among the teachers interviewed, the belief that students, parents, and school administrators are naïve about the importance of summative over formative assessment. This is relevant to literacy and ELA teachers since literacy and language skills span the curriculum and can affect students' academic progress in all areas.

Regardless of the types of assessments used, Hoover and Abrams (2013) found that classroom teachers use summative assessment data in order to shape daily instruction. Most of the teachers in this study stated that they used assessment results to evaluate their instructional practice and make adjustments to support student learning. The results suggested however, that teachers

engaged in a cursory analysis of student performance fairly regularly but conduct more in-depth analyses less often. This seems true since anecdotal evidence points to teachers lacking time and resources to delve deeper into data analysis. The researchers noted that the results of the study led to more questions about how teachers can effectively use summative data for instructional purposes.

Since assessments can be conducted and analyzed in a myriad of ways, literacy and ELA teachers do not assess students in the same manner. Braender and Naples (2013) raised questions regarding how teachers effectively use data. They noted that instructors find it difficult to assign grades to individual students engaged in team projects. This study used objective data from student activity logs from a Learning Management System (LMS) and also analyzed peer evaluations using a free, online tool CATME.org. The study investigated categories of measurement, task conflict measures, and satisfaction measures. The activity logs provided early intervention for students who weren't actively engaged in team projects. Because of the switch to objective data, researchers were able to recognize team problems and help students effectively manage teams or reconfigure the teams to create a successful learning environment.

While in the process of creating an evidence-based curriculum, Keister and Grames (2012) collected information from three different needs assessment methods and then analyzed the advantages and disadvantages of each method. The study concluded that one tool was not better than another because each delivers valuable information. The authors noted that educators can select the different method and techniques based on the required information.

Despite the type of curriculum or assessments are used, school systems have access to more data than ever before. Piro and Hutchinson (2014) indicate that the method in which schools use student data may alter and the conclusions from that data may also differ from teacher to teacher. This difference is a result of teacher experience and knowledge of data use. Teachers are expected to be knowledgeable in not only content area, but also be able to comprehend, interpret and use data for instructional interventions. Research suggests that training in data collection, analysis and the use of data closes the achievement gap (Piro & Hutchinson, 2014).

How educators collect and use data

When collecting assessment data, educators must know what data they are collecting and how it will help develop their instruction. Young and Kaffenberger (2013) studied a four-step process and a conceptual model, Making DATA Work (MDW), to help school counselors and district supervisors use data to drive decision-making to address issues such as achievement gaps and program effectiveness. The process aims to answer a question, which drives action research. The first step is to design an action research question. This question either seeks to understand an issue or aims to evaluate a program. The next is to plan the data. This step organizes the type of information that is needed to answer the research question. The third step is to track and analyze the data. Finally, once the data is shared, stakeholders and educators can then become more engaged in the process. Young and Kaffenberger (2013) found that once school counselors and teachers were taught that much of the data needed already exists, the application of the MDW process quickly aided educators and counselors to gain the accountability, data, skills, and confidence required to address assessment questions and instructional issues.

Ellis (2013) acknowledges the usefulness of data analysis for the purposes of understanding and optimizing learning and its contexts, but also claims that too much emphasis on learning analytics is impractical because not all learning environments share the same behaviors and interactions. Ellis also asserts that when the focus is primarily targeting at-risk students, only a small amount of the students receive attention in the literature on learning analytics. For teachers, using their content expertise is useful and directly applied to learning when analyzing assessments, but a more detailed level of data has been too difficult for teachers to collect and balance. Kan and Bulut

(2014) discussed the subjectivity and inconsistency of teachers when collecting data associated with scoring assignments. Their research found that when there are no scoring guides for teachers to use, teachers' scoring of assessments were inconsistent. When rubrics were used reliability increased. The researchers also concluded that the teachers that had more teaching experience were more lenient in their grading. Rosen and Tager (2014) also examined different assessments, but used assessments within computer-based educational environments. The study concluded that students provided more informed recommendations by using supporting evidence and could discuss alternative points of view.

Utilization of data

Data based decisions are correlated with increased student achievement, but most teachers do not use the data or do not know how to use student data to its full potential. Poortman (2015) found that decisions made by teachers were generally based on intuition and on limited observation. This study examined the factors influencing data team procedure. Data teams were comprised of school leaders and teachers who work together to learn how to use data. The conclusion of this study revealed how several data characteristics (e.g. access to data), school organizational characteristics (e.g. shared goal), and individual and team characteristics (e.g. pedagogical content knowledge) influence the use of data in data teams. Although the study did not allow generalization, it does provide insight about the factors that hinder and enable interventions. The more successful data teams had higher access to information, could hypothesize causes to problems, and could design measures of correction. Less successful data teams had limited access to data.

Schildkamp, Poortman, and Handelzalts (2015) also described data use in their case study. The study concluded that implementing data use is not a linear process. Data teams continually go through feedback loops with each inquiry made. This results in reaching higher levels of inquiry. Every team involved in this study would return to previous steps of the procedure. The researchers note that new knowledge can also be built on hypotheses that turn out to be false. This type of knowledge might be even more important than knowledge on hypotheses that turn out to be true. It might prevent schools from investing time and money in interventions that do not solve the problem because cause of the problem is not fully addressed.

Research has demonstrated that teachers and school leaders can incorporate technology in a variety of methods to engage students, assess student understanding, access information to support content, and acquire new skills. Gibson (2013) studied three perspectives on analysis of student performances in SimSchool, a cloud-based simulated environment. SimSchool recreated the complexities of a classroom in order to measure the pedagogical knowledge and teaching skills of aspiring teachers. The program automatically collected data as the novice teachers engaged with the artificial students, and then recommended how the teachers should interact with the artificial students. In the simulation, the various features of teacher assessment such as data collection methods and analysis could be practiced because the program is highly interactive and adaptive in learning. This cloud-based, simulated environment was used to provide learning and training opportunities, and advance assessment practice and knowledge (Gibson, 2013). The author of the study concluded that mobile technologies could aid teachers with the acquisition of assessment knowledge, practice skills, and promote other kinds of interactive educational applications. In another study tied to the perception of educational assessment systems, Hebert (2012) revealed that a critical concern regarding technology and assessment system use is connected to the issues of change with individuals and within organizations. The researcher concluded that regardless of the technology and assessment systems being used, the impact would only come to fruition if people use it.

Professional development and data culture

Recent studies have indicated that teachers' effective use of student assessment results could improve student outcomes, including graduation rates (DePaoli, Balfanz, & Bridgeland, 2016). Balfanz, Bridgeland, Bruce, and Hornig-Fox (2013) discussed in their executive summary that evidence-based strategies could address dropout rates, and improved data systems could be used in early warning indicators and intervention strategies. The researchers asserted that a more coordinated approach in analyzing data, early warning indicators, intervention systems, and tracking students in real world examples has a positive effect on graduation rates. Perez (2012) also examined the use of professional learning communities, interventions for low performing students, and the use of data-driven instruction within the classroom settings with formative assessments. The researcher found that when professional learning communities used data to track student learning, teacher workload decreased and teachers increased their use of remediation and enrichment opportunities for students. Perez (2012) highlighted the process involved in implementing data-driven instruction through formative assessments, and then how that information can improve teacher collaboration. The results indicated a positive correlation between data-driven instruction and teachers' perception of their effectiveness. The teacher teams using data in the study met weekly to analyze the data and to make decisions about student and teacher learning. The researcher concluded that by using data-driven instruction, the needs of each student are placed at the forefront in instructional planning.

Hubers, Poortman, Schildkamp, Pieters, and Handelzalts (2016) studied data teams and how these groups of teachers and school leaders create knowledge in a case study. In this study, data teams were groups of teachers and school leaders that would collect and chart data, analyze strengths and obstacles, and then establish goals for an educational problem. Hubers et al. conducted a case study for two data teams over the course of two years analyzing the modes, transitions, and knowledge creation using four-stage model of socialization, externalization, combination, and internalization (SECI). The authors reported that the teachers and school leaders indicated that they learned more about curriculum and assessment when they were engaged in activities such as brainstorming on hypotheses, providing background information, brainstorming about possible solutions, and reflecting on data. The data teams met twice a month for two years. During the observation of meetings, the researchers documented and coded the creation process of each meeting. Data teams learned most about content when they engaged in socialization and internalization modes and displayed more personal engagement and gained deeper knowledge with the collection of data. Regarding transitions, the authors concluded that knowledge creation was a cyclical process because data teams seem to follow the steps of data team procedure (as reported by Schildkamp & Poortman, 2015). The researchers also found the team members who engaged more often in the meetings and overall process of knowledge creation gained a greater and deeper level of understanding of the educational problem being addressed. The research provided insight into how educators in the context of PD and how support can be given.

In creating a school culture that routinely uses data to inform instruction, the process of data-driven decision-making must be utilized. Lange, Range, and Welsh (2012) studied five factors associated with effective implementation of a school culture that uses data to inform instruction: school leadership and data, leadership teams, data accessibility, school culture, and data sources. The authors concluded that building administrators must focus on collaboration between school leaders and teachers who have a vested interest in data analysis. Lange, Range, and Welsh (2012) also stated that in order to foster the conditions for a culture driven by data, principals must stress the importance of shared leadership responsibilities, professional development responsibilities, and school culture responsibilities. In addition to school administration establishing a clear vision, purpose, and goals for their school, the authors argued that principals must focus on the

responsibilities of leadership, professional development, and also foster a culture of continuous inquiry.

Almy and Tooley (2012) studied conditions such as the leadership of principals, working alongside colleagues, and work environment that impact the effectiveness of teachers and the job satisfaction of teachers in high poverty schools. The authors of this study found that teacher satisfaction is more influenced by the culture of the school. Especially important to teacher satisfaction and retention is strong leadership and staff cohesion.

In planning effective development sessions, researchers have identified several obstacles to implementing effective training. Galloway and Lesaux (2014) conducted a comprehensive literature review to evaluate how the role of the reading specialist has been altered by the changes in federal policy since 2001. The researchers stated that the job description of the reading specialist now involves such tasks as managing data, serving as a resource to teachers, diagnosing problem areas for students, and instructing struggling students in reading. The researchers concluded that because positions are not standardized and the literature presented that training be diversified to fit various needs, all principals, teachers, and reading specialists need to engage in discussions that clarify the various roles, duties, responsibilities, and working relationships that will help to define and support this role in their school. In addition to identifying the different types of tasks and responsibilities that reading specialists are asked to complete, Galloway and Lesaux also explored literature for themes of conflicting perceptions of the role of the reading specialists by different stakeholders in the school community. The authors recommended policymakers, administrators, and researchers should attempt to understand the value of the non-instructional roles in supporting struggling students

Although data systems are used for student growth, study results have indicated that these systems can also promote professional growth in teachers. In Marzano's (2012) teacher evaluation system, both teacher growth and PD aspects are included. The system is based off the individual evaluation, which drives individual PD striving to improve teacher inquiry. Clarke (2012) studied 37 team leaders who led small groups of teachers through a PD program, Digital Learning Collaborative (DLC), which is designed to improve teacher research-based qualitative inquiry. The results indicate that the PD had an impact on teacher use of technology in the classrooms. Five themes were found to influence teachers: empowerment, teachers as researchers, the use of technology, workload, and engagement. The DLC PD (Clarke, 2012) model empowers teachers, which is essential in successful PD.

In Wang and Hurley's (2012) study, the authors found that assessment programs are more effective if teachers and faculty members are involved in the design, implementation of the program, and analysis of student data. Their study of academic assessment perception included over 200 university faculty and staff. The results indicated that the perceived benefit of assessment was significantly and positively connected to the participant's willingness to engage in assessment practices. The authors reported that the results suggested that the time invested in a program does not ensure the willingness of staff in embracing a program. The study results also indicated that lack of motivation, rather than time constraints hinders teacher engagement in assessment practices. The results of this study also showed that institutional culture did not have an important relationship with faculty willingness to apply assessment practices. The researchers found that the teaching staff in the study was more willing to get involved with an assessment program when they saw benefits to their own teaching and learning efforts.

Limitations and Further Research

This review of literature sought to explore a number of research questions related to teachers' current practices, experiences, and knowledge in using assessment data to shape their

instruction and to identify their perceptions of how assessment data should be used to shape classroom instruction. This is a complex topic: even if teachers' assessment literacy is high, this does not always mean teachers' knowledge and skill will translate into improvements in instruction. Given the sheer scope and amount of student data available to classroom teachers today, the effect of professional development meant to promote the use and analysis of that data should be a topic of great interest to the classroom teachers, educational leaders and stakeholders. With all that said, the issue that has application to a wide range of educators who wish to improve their own professional development.

Implications exist, of course, for educators, as well, who might be looking at ways in which undergraduate teacher education programs prepare (or do not prepare) their students for the challenging task ahead of interpreting and analyzing student data. A second important implication of this study derived from the fact that there is no clear-cut method or assessment that meets all of the needs of teachers and the information that they need to improve their practice. There are research-based instructional frameworks, which can apply to various learning environments and will allow school districts to customize the framework to fit their local schools. However, there are no one-size-fits-all answers to assessment questions. Another limitation stems from the fact that educational administrators and policy makers do not share the same knowledge of the importance of assessments. In this sense, this review of literature is especially timely, and further work is necessary to examine the practices of assessment knowledge and how this can affect literacy instruction.

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