The Impact of a State-Wide Professional Development Model on Teachers' Formative-Assessment Knowledge and Practices

Abstract

Formative Assessment for Michigan Educators (FAME) is a state-wide professional development program designed to enhance teachers' formative-assessment practices in support of student learning. FAME is based in local learning teams composed of coaches and learning team members (LTMs) who are interested in learning about and implementing formative-assessment practices. This paper presents findings from a study of the characteristics of the FAME model that influenced coaches' and LTMs' knowledge of formative assessment and implementation of formative-assessment practices. 198 coaches and LTMs were surveyed about their perceptions of the FAME experience and their success in classroom implementation. Findings indicate that learning teams supported coaches and LTMs in improving their knowledge of formative assessment and classroom implementation, especially when administration provided time and support. This paper discusses the implications of the findings for changes to the next iteration of the FAME model, especially related to learning team design and connections with classroom practice.

Keywords: Formative Assessment, Professional Development, Teacher Learning.

In 2006 the State of Michigan adopted new high school graduation requirements. In order to support student success in meeting these requirements, the Michigan Department of Education designed a comprehensive and balanced assessment system to include different assessment modalities whose purpose was the promotion of students' learning. Its features included instructional-unit-based benchmark assessments used during courses; summative, end-of-course exams; and teacher professional development about how to assess students formatively as teachers are instructing their students. Formative Assessment for Michigan Educators (FAME) started in 2008 to provide a professional development program to Michigan teachers to support the implementation of effective formative- assessment practices in all classrooms in order to support student learning.

The structure of the FAME model is designed to support teachers, in a team setting, in learning about formative-assessment theory and techniques as well as providing impetus to implement, reflect on, and refine new instructional and assessment practices. The learning teams, or communities of practice (Wenger, 1998), are developed within local contexts and composed of "coaches" (i.e., team facilitators) and learning team members interested in the study of formative assessment. In parallel, FAME has developed a research model that focuses on continuous data collection and analysis to gather evidence about implementation to improve and refine the professional development model. The main goals of this research process are to collect information about the factors that lead to successful implementation of the formative-assessment professional development program (Authors, 2011). The purpose of this study is to examine the impact of the learning teams on coaches' and LTMs' knowledge of formative assessment and classroom formative-assessment practices.

Professional development in formative assessment is important because many teachers lack expertise in formative-assessment practices that may positively impact student

learning (Black, Harrison, Lee, Marshall, & Wiliam, 2004; Stiggins, 2009). In particular, goals of formative-assessment professional development may be to: increase teachers' abilities to collect evidence of student learning; analyze student evidence to determine adjustments in instruction; provide specific feedback that helps students understand what they need to improve their own learning (Schneider & Randel, 2009); and help teachers improve their instructional effectiveness (Popham, 2008). Results of different models of professional development in formative assessment, however, show the complexity of designing effective programs as well as conducting research studies that determine the effectiveness of those programs (Schneider & Randel, 2009). Therefore, the main contribution of this study is to provide information about a statewide professional development program such as FAME and about participants' learning and classroom practices based on the implementation of the model.

Literature Review

Formative assessment (also known as assessment for learning) is the process by which teachers use evidence of students' understandings to modify their teaching to make it more effective and students use evidence to improve their understandings. When implemented adequately, formative assessment is a key practice for promoting student learning (Black & Wiliam, 1998; Black et al., 2004). In general, formative assessment should emphasize: the enhancement of student learning; the examination of instructional ways to improve students' achievement of learning targets (Popham, 2008; Webb & Jones, 2009); the collection and use of information to adjust learning and teaching (Ofsted, 2008); the meaningful use of that information by teachers, students, and parents (Webb & Jones, 2009); and the understanding

of this process as reflexive and relational in shaping classroom learning and instruction (Buck, Trauth-Nare, & Kaftan, 2010).

Effective formative assessment also needs to be seen as a process rather than a product. Simply embedding assessment in curriculum will not impact students unless teachers use the information from assessments to modify their teaching (Yin et al., 2008) and students use the information to improve their learning (Coffey, 2003). Moreover, teachers need to be comfortable in taking formative-assessment strategies and incorporating them into their patterns of classroom practice (Black et al., 2004). Despite its importance for improving student learning (Black & Wiliam, 1998), teachers, especially those beginning their careers (Athanases & Achinstein, 2003) struggle to implement formative- assessment practices to effectively promote student learning (Black et al., 2004; Daws & Singh, 1996). Thus, understanding the factors that affect teachers' implementation of formative assessment in the classroom is important in the development of professional development programs.

Factors that Affect Implementation of Classroom Formative Assessment

A better understanding of formative assessment can help teachers focus their practices on enhancing student learning and adjust instruction accordingly. Therefore, well-designed professional development focused on developing strong formative-assessment competence and skills must consider factors or conditions that affect the implementation of these assessment practices. Main factors that affect implementation of formative assessment in the classroom are: teachers' beliefs, school culture and support, time and support, level of teaching, teachers' knowledge, and teachers' understanding of assessment. In the following sections, we explore each of these factors.

Teachers' Beliefs

Many studies have shown that the implementation of classroom assessment is strongly related to teachers' beliefs, attitudes, and conceptions about teaching, learning, curriculum (Black & Wiliam, 2005; Sato, 2003; Shepard, 2000; Webb & Jones, 2009), and assessment (Brookhart, 2007; Matese, 2005). Moreover, there is often a gap between teacher espoused beliefs about formative-assessment and classroom practices (Van Niewenhoven & Jonnaer, as cited in Allal & Mottier-Lopez, 2005). The implementation of formative assessment requires not only having the necessary knowledge and skills, but also that teachers have the appropriate attitudes toward the role that formative assessment can play in enhancing teaching and learning (Heritage, 2007). Without this attitudinal component, initiatives to enhance formative assessment may be seen by teachers as another task to add to their demanding schedules that is imposed externally.

Research on teachers' beliefs in formative assessment illustrates that how these beliefs interact with the cultural milieu present in classrooms and schools is very complex (e.g., Mc Millan, 2003; Matese, 2005; Sato, 2003; Webb & Jones, 2009). Matese (2005) argues that creating assessment opportunities, an instructional practice, is affected by the combination of beliefs about the purpose of assessment and beliefs about making curricular decisions (i.e., what to teach and what to assess) and these beliefs interact with different categories of teacher knowledge and skills. In addition, national contexts also play a large role in teachers' beliefs about formative assessment, for example, in the different emphases of educational policies regarding high-stakes testing (Brown, Lake, & Matters, 2010; Song & Kogh, 2010). Implementation of formative-assessment practices is also affected by contradictions between teachers' beliefs about learning and the existing culture in the classroom community (Webb & Jones, 2009). For example, teacher emphasis about being "objective and fair," a belief

traditionally associated with grading, remains influential in the implementation of formative assessment, which requires the integration of several variables to make ongoing adjustments.

Support Within the School Culture

Changes in formative-assessment practices of teachers are more likely to occur if they are a collective effort, with support from school principals and administrators, and dissemination of information and practices about formative assessment in the school building (Black et al, 2004; Ofsted, 2008; Webb & Jones, 2009; and Wyllie, Lyon, & Goe, 2009). Collaboration also helps teachers to share responsibilities for the implementation of classroom formative assessment practices. The implementation of successful formative-assessment practices in schools is strongly related to school administrators' support, leadership, and effective communication (Stiggins, 2009) as well as administrators' trust and high expectations (Ofsted, 2008); especially to develop collective efforts to implement formative-assessment practices at school building or district levels.

Wyllie et al. (2009) reported that success in the implementation of formative assessment was mainly affected by the quality of administrative support provided at the district level and the school level. At the school level, important factors that affect effective implementation of formative assessment are: a clear vision of teaching, learning, and assessment developed by staff; high expectations of teachers; and an agreed drive towards consistency. By contrast, schools whose success with formative assessment is weaker omit one or more of these key aspects of implementation (Ofsted, 2008).

Time and Support

It is recognized that changes to teaching practice are slow and need to be gradually implemented (Bennett, 2011; Black et al., 2004; Black & Wiliam, 2005; Webb & Jones,

2009; and Wyllie et al., 2009). Webb and Jones (2009) concluded that successful implementation of formative assessment depended on a number of conditions, such as addressing teachers' own beliefs, students' beliefs, the repertoire of mediating artifacts, and the existing culture in the classroom. Additional factors that affected success of implementation were the degree of compatibility between the formative-assessment strategies to be implemented and the characteristics of school curriculum; the subject of the learning communities' members; and their degree of accountability. Similarly, in the context of mentorship for new teachers, Athanases and Achinstein (2003) concluded that teaching and learning about classroom assessment is complex, because it involves considering the intricacies and challenges of enacting multiple domains of assessment in the context of classrooms. In addition there tends to be a lack of competence, preparation, and professional development of mentors in innovative classroom assessment practices. Teachers offer rare and scarce opportunities for student peer-assessment and self-assessment, despite their potential for learning because in many schools these approaches are abandoned because they take too much time (Ofsted, 2008). For formative assessment to take hold in classrooms, timing, as a critical issue, needs to be better managed in schools by increased collaboration with and support from colleagues and administrators.

Level of Teaching

Most of the formative-assessment initiatives reviewed were targeted to elementary teachers rather than to secondary teachers. Elementary teachers tend to use more varied assessments and include a larger range of methods and "academic enablers," such as effort and improvement, than secondary teachers do (Brookhart, 2007). Ofsted (2008) reported that the impact of implementation of assessment of learning was higher for elementary students than secondary students. This is attributed to the fact that elementary teachers are used to

teaching different subject areas, and so they can prioritize the subject in which they feel more confident (e.g., in which they have more pedagogical content knowledge) to implement formative assessment, and then they can transfer this approach to other subjects, once they have gained some experience in the implementation. By contrast, secondary teachers are more specialized in their subject areas, so collaboration between teachers tends to be lower. This issue is also exacerbated because the assessment foci at the secondary level have been traditionally on summative assessment and preparation for tests and examinations; the barriers to innovation and change tend to be higher in secondary than in elementary levels (OECD, 2005).

Teachers' Knowledge

Formative assessment requires a complex set of integrated skills associated with content knowledge, pedagogical knowledge of students, and data analysis, each of which has to be developed and integrated with the others (Otero & Nathan, 2008). Teachers' content knowledge is important for formative assessment because it influences both instructional quality and teachers' ability to pose precise questions to elicit students' understanding (Matese, 2005).

Borko and Putnam (1996) organized pedagogical content knowledge (Shulman, 1986) in four categories: the overarching conceptions of teaching a particular subject; knowledge of instructional strategies and representations of teaching particular topics; knowledge of students' understanding; and knowledge of curriculum and curricular materials. Thus, assessment knowledge is part of the domain of pedagogical content knowledge (Athanases & Achinstein, 2003) and it determines in teachers' formative- assessment practices and instructional decisions related to student learning (Matese, 2005). Similarly, formative assessment involves teacher skill such as having models of student thinking, providing

feedback to students, analyzing students' responses to adjust instruction, and developing good assessment tasks that provide detailed information to students about their accomplishments (Black, Harrison, Lee, Marshall, & Wiliam, 2003).

Formative assessment is equally applicable in all content areas, although different strategies and tools may be more or less useful in different content areas; especially considering the diverse ways in which the subject is interpreted in the school curriculum (Black et al., 2003). Teachers tend to start developing their formative-assessment practices in the area that they are most comfortable with (Webb & Jones, 2009), so when teachers work collaboratively, they can learn from experiences used in other subjects and transfer that to their own particular subjects (Black et al., 2004).

Teachers' Understanding of Assessment

Many teachers are not aware of the different goals that different types of assessment have. For example, in the context of an elementary school science program that involved the development of formative-assessment practices, Forbes (2007) reported that teachers held beliefs about assessment only as tools for teacher use and for accountability rather than as a method for involving students in an assessment environment. Similarly, Stiggins (2006) suggested that, as a result of their lack of preparation in classroom assessment, teachers are often unable to differentiate among the needs of information of different students with various characteristics.

The strong influence of traditional approaches to assessment, such as viewing all assessments as summative and for grading purposes (Stiggins, 2006; Song & Koh, 2010) affects implementation and use of formative assessment. Black et al., (2004) mentioned that grading practices tend to emphasize competition rather than improvement and this type of assessment feedback often has a negative impact, particularly on low-achieving students.

The predominance of grading and summative assessment may be related to teachers' lack of training and experience in innovative classroom assessment practices (Athanases & Achinstein, 2003). Many argue that pre-service teacher education does not develop the formative-assessment competence of new teachers (Buck et al., 2010; Popham, 2009; Stiggins, 2009); and hence the lack of new teachers' classroom assessment skills implies they understand assessment as a process more characterized by grading and accountability and separated from teaching, learning, and classroom practices. This situation tends to continue in school settings, because few teachers and school administrators have opportunities to learn about sound classroom assessment practices (Stiggins, 2006).

Professional Development in Formative Assessment and Teacher Learning

Professional development focused on formative assessment can be a powerful way for teachers to learn to respond to students' ideas and, thus, impact student learning (Popham, 2008). Meaningful professional development in formative assessment implies focusing on practices of teaching and classroom interactions and should attend to most if not all of the factors listed above: teacher beliefs, school culture, time, level of teaching, and specific types of teacher knowledge. Similarly, Schneider and Randel (2009) distinguished several characteristics of professional development in effective formative-assessment professional development: administrative support; individualization of teacher's learning goals; content knowledge; time; collaboration; coherence; and active learning.

Formative assessment should not be presented as a collection of tasks or tools to be implemented without framing a process in which the culture of the classroom and the roles of teachers and students change to make students' ideas the assessment focus. In professional development focused on formative assessment, the incorporation of students as active subjects, able to reflect on their learning and to make decisions accordingly, becomes

essential to generate relevant changes in teaching. Webb and Jones (2009), however, described how teachers may feel constrained in implementing strategies such as peer-feedback, which is partially affected by the contradiction between the teachers' beliefs about learning and the existing culture in a classroom community.

Professional development in formative assessment should also address teachers' characteristics. For Sato (2003) professional development can connect teachers' personal approaches to assessment with their overall instructional practices when it is focused on the teaching and learning interactions. Similarly, when teachers have opportunities to guide their own learning, they make more connections with classroom practices and thus better translate the focus of the professional development, such as formative-assessment practices, into their own practice (Schneider & Randel, 2009).

Research on the effectiveness of various professional development models focused on formative assessment has reported changes in teacher practices, such as questioning, feedback, use of peer-assessment and self-assessment, and the formative use of summative assessments (e.g, Black et al., 2004; Sato, 2003). Moreover, teachers have been shown to modify their role in the classroom, from presenters of content to leaders of an exploration and development of ideas in which students are involved (Black & Wiliam, 2004). After specific professional development around formative assessment, Webb and Jones (2009) reported that students were more likely to take responsibility for their own learning and teachers were more likely to support students' learning process and learning orientation. Furthermore, teachers reported changes in their beliefs. Assessment practices of teachers sometimes reflect their beliefs or attitudes regarding issues such as questioning, grading, feedback, written work, and students' peer and self-assessment (Black et al., 2004). For example, Webb and Jones (2009) reported that teachers changed their beliefs about the effectiveness of formative

assessment, but also remarked that the main driving force and motivation for teachers to persist with the implementation of formative assessment are the challenges and tensions between teachers' beliefs about learning and the existing culture in the classroom community.

Professional Learning Communities

Professional learning communities (PLCs) provide opportunities for teacher learning and change by enabling teachers to work collaboratively toward a common goal (Grossman, Wineburg, & Woolworth, 2001) and constitute a vehicle for supporting collaborative inquiry (Nelson, Slavit, Perkins, & Hathorn, 2008). The interaction of people who bring expertise in their areas can facilitate the interchange of experiences and practices and teachers can reflect on their own practice by observing and discussion of how others are doing. Because of its school-based nature, PLCs can provide support for teachers to make changes in classroom practice, become a space for reflection and insight, engage teachers in a community that can be sustained over time (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006; Wenger, 1998), and attend to process and content, by engaging teachers in authentic problems within their professional practice (Wilson & Berne, 1999).

Professional learning communities constitute one effective model of professional development to enhance teachers' formative-assessment knowledge and practice (Popham, 2008). This model helps teachers to detect and examine their needs, beliefs, priorities, assumptions, and assessment by providing support and a method for actively engage each teacher in setting out their learning and making changes in classroom assessment practice by focusing on student understanding (Sato, 2003; Black et al., 2004); enables collaboration; and may impact not only in their members, but also in the schools where they taught (Willie et. al., 2009).

In sum, providing professional development opportunities to teachers is important in promoting teacher learning and change in classroom practices that impact on students (Desimone, 2009). Implementing classroom formative assessment focuses teachers on a continuous process of data collection from students, and using this data to make instructional adjustments including helping students regulate their own learning. In the case of a professional development based on professional learning communities such as the FAME model, teacher learning implies focusing on the individual learner as well as on the participation in a school community (Putnam & Borko, 2000). In this study we analyzed data provided by the participants in the professional development, as a way to understand their perceived learning and changes in practice based on participation in learning teams. We recognize that, amidst the complexities of designing effective formative-assessment-related professional development and designing research that determine the effectiveness of those programs (Schneider & Randel, 2009), participation in learning teams contributed to coaches' and LTMs' learning of formative assessment and gradual implementation of classroom practices, especially when this collective effort was supported in school settings.

Methods

This section describes the procedures we used to address our research questions. We present our research questions, describe the characteristics of the sample and the survey used to gather data, and describe the procedures for analyzing data and organizing the results.

Research Questions

The purpose of this study was to examine the impact of the FAME learning teams on coaches' and LTMs' knowledge of formative assessment and classroom formative-assessment practices. Accordingly, the two research questions were 1) What is the impact of learning teams on coaches' and learning team members' (LTMs) knowledge of formative assessment and classroom practices? 2) What factors influence coaches and LTMs learning experience? Each of these questions was used for choosing the variables, organizing the data, and discussing the findings.

Survey Participants, Design, and Development

In the second year of the FAME professional development program, sixty-five learning teams across the state of Michigan participated. This included 100 coaches and 420 LTMs from 145 schools within 68 districts. For this study, we used data from 45 coaches and 153 LTMs who responded to a survey administered at the conclusion of the activities for the 2009-2010 school year. Learning teams consisted of volunteer teachers and administrators interested in the study of formative assessment.

In the FAME professional development, the composition of learning teams was variable; some teams were grade-level teams, some content-area teams, some school-based teams, some district-level teams. For our sample, the predominant learning team makeup was participants from different content areas and across grades (55%), while the proportion of participants who were in same-content area teams was lower (27%). In addition, the proportion of coaches and LTMs who participated in same-building teams was similar to those from cross-building or cross-district teams (for both, 38%). Seventy-three percent of the LTMs and coaches reported the presence of a school administrator or curriculum specialist on their learning teams.

The end-of-year survey was designed for gathering information about learning team implementation and participants' learning of formative assessment. The findings were used to make adjustments to the professional development model, according to the FAME's iterative design-based research model. Responding to the survey was voluntary and anonymous, so data from individual participants and from learning teams could not be linked.

The survey had 35 questions that combined closed-response items (Likert-scales and multiple-choice with multiple and single answers) and open-response items and was divided into five sections. The first section measured coaches' and LTMs' perceptions of the professional development model and learning team implementation. Its questions covered aspects such as learning team makeup; meeting frequency; perception of the adequacy of meeting frequency; reservations that impacted learning team members' participation and learning; impact of the learning team as a tool for learning and implementation of formative assessment; and opinions about the learning team experience. The second section, *classroom formative-assessment practices*, measured perception of classroom formative-assessment implementation. The questions covered aspects of the success of implementation of classroom formative-assessment practices; ease of implementation of formative assessment strategies; and participants' evidence of the implementation of the formative assessment process in the classroom. The third section of the survey, *student learning*, measured coaches' and LTMs' perception of the impact of formative-assessment implementation on students. The questions were about students' intended actions, motivation, and learning related to formative-assessment implementation. *Coaching*, the fourth section was targeted only for coaches and measured strategies and resources used by coaches as well as the appreciation of their training as facilitators of team members learning. The last section,

o*verall thoughts,* measured learning team members' needs of support and motivation for participating in future professional development processes.

Procedures for Analysis

We conducted an exploratory factor analysis to identify latent variables derived from the survey questions that can be used as outcome variables (e.g., related to successful implementation of formative-assessment practices). This factor analysis included six Likert-scales related to the impact of the learning team on the knowledge of formative assessment and the success in implementation of formative-assessment classroom practices. Results of the exploratory factor analysis, carried out by using the procedure of maximum likelihood with VARIMAX rotation, identified two latent variables that explained 49% of the variance. The first variable, which was named F*ormative-Assessment Implementation,* included four scales associated with success in implementing formative-assessment practices in the classroom, degree of modification of classroom assessment practices, success in sharing learning targets in student-friendly language, and success in providing descriptive feedback. The second variable was named *Impact of Learning Team* and included two scales regarding coaches' and LTMs' perceptions of the impact of the learning team on their own learning of formative assessment and also on implementation of formative-assessment practices in the classroom. Coefficients of the exploratory factor analysis are presented in Table 1.

In addition, a second exploratory factor analysis was conducted in order to identify if the four scales which included the identified latent variable F*ormative-Assessment Implementation* behaved consistently. The results indicated that these four scales grouped in

only one factor, which explained 43% of the variance of data. The analysis was carried out using the procedure of maximum likelihood with VARIMAX rotation.

Both exploratory factor analyses supported creating the outcome variable *Formative-Assessment Implementation.* Consequently, for enabling data analysis, the scores of the four scales that included this variable were summed and treated as a megavariable. We used the scores of the variable *Impact of Learning Team* in a complementary manner, to determine the impact of the learning team experience on perception of knowledge of formative assessment and classroom implementation.

We carried out a comparison of means using a t-test for independent samples to explore possible differences between the impact of the learning team on learning of the formative-assessment process and the impact of the learning team on implementation of the formative-assessment practices in the classroom. In addition, we used frequencies of responses to the multiple-choice items and the open-response questions for describing and deepening the results obtained by the statistical analyses.

In order to explore the second research question about factors that influenced coaches' and LTMs' learning team experience, we conducted cross-tabulation (Chi-square) analyses to compare the distribution of responses to the multiple-choice items according to their scores on the megavariable *Formative-Assessment Implementation*. This identified characteristics of coaches and LTMs that were associated with implementation of formative-assessment practices. The multiple-choice items included in these analyses were about learning team makeup; meeting frequency; appreciation of meeting frequency; coaches' and LTMs' reservations about participation and learning; and participants' needs of support.

We also calculated Pearson's correlations among the variables. These variables focused on types of learning that participants declared and the ease of implementation of

formative-assessment topics. We also examined variables related to Coaches' and LTMs' perceptions of the impact on student learning and motivation to complement the correlations. Finally, we included the descriptive frequencies of related multiple-choice items and responses to open-ended questions in the analysis in order to explore possible explanations of the correlations' values.

Results

The results of the study are organized according to the two research questions of the study. We first present the findings about the impact of learning teams on coaches' and LTMs knowledge of formative assessment and classroom formative-assessment practices. Then we present findings related to factors that influenced coaches' and LTM learning.

Learning Team Impact on Formative-Assessment Knowledge and Classroom Implementation

In FAME, learning teams are designed as a space for collaboration and learning among LTMs and coaches, where they work together learning about formative assessment. LTMs reported that these teams positively impacted their knowledge of formative assessment (99% considered the teams as having a positive impact) and implementation of formative-assessment practices in the classroom (96% considered the teams as having a positive impact). While the learning teams had an overall positive influence on both knowledge and practice, coaches and LTMs reported a higher impact of learning teams on their *learning* of the formative-assessment process than on *implementation* of formative-assessment practices in the classroom ($p<0.01$). For example one coach mentioned the activities contributed to increased learning about formative assessment.

> We had time to have deep discussions about the "art of teaching" around formative assessment. Ideas were shared, support between members given and students success results reported.

In the analyses of the open-response questions, coaches and LTMs recognized the positive effect of learning teams. For example, LTMs and coaches stated that learning teams provided them with an opportunity to share ideas about classroom practice, a space for professional growth and reflection, an opportunity for learning about formative-assessment topics, and a means of support for the successful implementation of these practices in the classroom. As one LTMs said, the learning team "gave me the courage and accountability" needed to implement formative-assessment strategies as well as "feedback time to reflect that helped me to continually improve." Additionally, coaches and LTMs also mentioned characteristics of the learning team design, such as quality of coaching and resources used, that enabled the learning team experience.

Coaches and LTMs reported successful implementation of several formative-assessment practices. In fact, 70% of participants reported moderate or significant success in classroom implementation of all dimensions of formative-assessment practice. However, as shown in Figure 1, LTMs indicated the most success in sharing learning targets in a student-friendly language, while the other practices showed similar proportions of success in implementation.

Perception of Teacher Learning and of Student Learning

As a result of the learning team experience, coaches and LTMs reported different types of learning. Increased knowledge about practical formative-assessment instructional strategies was the most mentioned response (92%). Moreover, participants also reported high levels of learning about the conceptualization of formative assessment (what formative assessment is and what formative assessment looks like) and how to fit formative assessment into the curriculum (79% each). For example, one LTM described that in her learning team she learned about, "posting the learning standard and making students aware of the learning target." Similarly, working with colleagues in her learning team was crucial for learning because the "immediate feedback allows me to adjust my future formative assessment."

Correlations among these kinds of learning are presented in Table 2. Learning *what formative assessment is* had higher and significant correlations with other kinds of reported learning, indicating that conceptualization of the concept of formative assessment may be a baseline for more practical learning about and implementation of formative assessment. There was also a significant correlation between learning practical formative assessment instructional strategies and how to fit formative assessment into the curriculum, suggesting that these kinds of learning may be associated with classroom implementation of the process.

93.7% of coaches and LTMs reported positive changes in student learning. The more frequent and immediate types of learning that coaches and LTMs perceived were students' understanding of learning targets, students' ownership of their own learning, and students' reflection during their learning. Changes in student motivation also tended to be perceived along the school year. For example, one LTM pointed out:

> My students like the learning targets. They would remind me to write them down. Toward the end of the year, I started having them tell me what it should be. They didn't like at first, but everything they got it and did really well.

We also examined the correlations among the different types of changes in student learning, reported by coaches and LTMs. Responses show that coaches and LTMs' perception of changes in students' motivation to learn, students' reflection on their own learning, and student ownership of learning are positively correlated ($p<0.01$) with improvement on summative assessments. In addition, teachers' perception of improved student motivation was correlated ($p<0.01$) with changes in students' taking ownership of their learning and students' reflecting more on their learning.

Implementation of Classroom Practices

According to the perception of participants, formative assessment strategies differed in the degree and ease of implementation. 48.6% of coaches and LTMs said that descriptive feedback was the easiest topic of formative assessment to implement in the classroom, while self- and peer-assessment were the hardest (42.9% of coaches and LTMs). One LTM illustrated that the efforts to implement self- and peer-assessment, while positive, were slow to implement.

> When students wrote essays - would have them peer/self edit. Obstacles included staying on task, doing the assessment correctly and effectively. Instead of giving constructive criticism, they would say "looks great, nothing's wrong". Some success would be that some students did evolve and start pointing out what was missing/needed/fixed or what was great.

Coaches and LTMs reported their perception of student involvement in the formative-assessment process. The proportion of coaches and LTMs who reported a moderate and significant perceived success was the highest for *students' involvement on their learning*, followed by *student involvement in the Formative-Assessment Process.* For coaches and LTMs, average and low performing students were the most positively impacted by the implementation of the formative-assessment process. Also, responses showed no evidence that this process negatively affected any group of students. A LTM who works with special education students said:

> I've encountered many frustrations and lack of confidence in their [special education students'] learning. My students are much more proactive and have improved in their academics. Whether it's graded or not, my students have performed better when they know, where they are heading and have better goals.

Factors Influencing Implementation of the Learning Teams and Formative-Assessment Classroom Practices

Despite the general positive impact of the learning team model on knowledge of formative assessment and classroom practices, survey responses indicated that there were factors that influenced the strength of the impact. Our data analysis identified two factors that affected classroom implementation of formative assessment: time and knowledge of formative assessment as well as two factors that influenced the work of learning teams: team makeup and meeting schedule.

Factors Influencing Classroom Formative-Assessment Practices

Even though a high proportion of coaches and LTMs recognized the positive impact of the learning teams for their learning and implementing formative assessment in the classroom, two factors that tended to hinder teachers' overall implementation. Teachers who responded that they had "reservations about time for implementing formative- assessment practices in the classroom" had lower perceived success in the variable *Formative-Assessment Implementation* ($p<0.05$). Similarly, teachers who reported having "reservations about knowledge of formative assessment" had lower perceived success in implementing formative-assessment practices ($p<0.01$). These reservations were also the most frequent issues mentioned by participants (36% and 25%, respectively) when given a checklist of reservations that they had and these findings were reinforced in the open-ended responses (See Table 3). Moreover, responses to open-ended questions emphasized the importance of having enough time for successful implementation, having adequate support from administrators and schools, and making meeting schedules compatible with schoolwork demands as related to successful learning and participation in the process.

Factors influencing learning team work

Meeting Time

Most LTMs and coaches reported they met once a month (70%), twenty one percent of the LTMs met twice a month and nine percent reported other frequencies such as every other month with longer meetings (e.g., full day, 4-5 hours) or flexible designs during the school year. In general, most participants considered their meeting schedule to be adequate (66%); however, 28% thought that there was too little meeting time. Coaches and LTMs who met once a month for two hours had a significantly worse evaluation of the appropriateness of the

meeting schedule compared with those who met more often or for longer meetings ($p<0.01$). For example, one teacher who met once a month declared:

> What we did accomplish when we met was useful, but we didn't meet enough to keep the initiative moving forward. We either need to meet more often, or we need some kind of between-session accountability system in place.

Learning Team Make-up

According to open-ended responses, coaches and LTMs tended to appreciate heterogeneous groups more than homogeneous groups, by emphasizing that in heterogeneous groups participants had the opportunity to learn how to implement formative-assessment practices from different experiences and perspectives. However, there were some participants whose responses indicated that they preferred more homogeneous groups, especially with participants from the same content area. Different perceptions were reported about the presence of administrators on the teams. For some participants this was positively appraised because it helped administrators be involved and engaged in the formative-assessment learning process, while for others, this fact limited team dynamics (See Table 4).

Discussion

The findings of our study suggest that the work in learning teams enabled coaches and LTMs to make improvements in their knowledge of formative assessment. Learning teams were effective in supporting teachers' classroom implementation, especially when these efforts were accompanied with support from the school administration. Learning teams were a

space to share classroom and school-based experiences, discuss topics of formative assessment, and get support and feedback about innovation in their classrooms. Effective professional development based on learning communities such as in the FAME model needs to be sustained over time to facilitate changes in teacher practices (Black et al., 2004; Black & Wiliam, 2005; Webb & Jones, 2009; and Wyllie et al., 2009) and engage teachers in a milieu that supports teacher learning (Stoll et al., 2006; Wenger, 1998). For many coaches and LTMs, participating in the FAME model was highly appreciated, especially because that team-based experience allowed coaches and LTMs to have time and space to challenge their current views of assessment as well as to take risks and try out new classroom strategies and tools. Working with their learning teams, LTMs could reflect on incorporating formative-assessment practices into their teaching to promote students' learning. Moreover, learning teams tended to support teacher learning about formative assessment and helped teachers be accountable for the new learning in their particular settings.

The ongoing work in a learning community allows conversations about differences in ways of conceiving teaching and learning emerge (Thomas, Wineburg, Grossman, Myhre, & Woolworth, 1998). In the FAME project, many coaches and LTMs recognized that the instructional practices of others can be helpful to get new insights in their content area or level of teaching. It seems that learning teams made up of teachers from different backgrounds were adequate for reflecting on teachers' own assessment practices. Similarly, the presence of school administrators was appreciated by many LTMs, because this contributed to increased involvement of administrators in the process, to understand the complexities of the instructional implementation of formative assessment, and to provide support in the school buildings. Members of other the learning teams, however, had a more

reluctant perception of working with school administrators, especially when the factors mentioned above were less accomplished. The inclusion of school administrators in the learning teams can facilitate the impact of the learning team on classroom practices when they were engaged with the process of supporting teacher change and promoting collaboration in schools. In particular, the efforts to change teacher practices are key factors that have to be sustainably implemented over years and included in the school professional development vision.

Since pedagogical content knowledge determines formative instructional practices (Black at al. 2003, Matese, 2005), it is essential that the learning team experience addresses some deeper notions of content knowledge related to the formative-assessment practices for specific types of classrooms. In that sense, we agree with Schneider and Randel (2009) who point that future research on effective professional development programs needs to determine the content-specific component of formative assessment. Thus, the finding that teachers found heterogeneous groups to work particularly well is curious and one that needs more exploring. Perhaps, these heterogeneous groups work well for beginning learning teams who are most concerned with exploring general strategies. However, once LTMs need to move beyond general strategies to more discipline and grade-specific ideas, content-specific teams might be more beneficial.

The survey results show that school support is a key factor for successful classroom implementation of formative-assessment practices, especially from the administrative level, which is consistent with findings from other studies (e.g., Black et al, 2004; Ofsted, 2008; Webb & Jones, 2009; and Wyllie et al, 2009). Coaches and LTMs emphasized that the process of change in their practices requires support by providing time to meet, discuss, and try out the new formative-assessment practices they have learned about and discussed with

other team members. No less important, teachers need time to engage with the idea of formative assessment in their learning teams —to really get comfortable with the knowledge and practical strategies (again, this is consistent with other studies, e.g., Thomas et al., 1998). More importantly, survey responses indicate that teachers need school administrators to understand the processes of change that require teachers to learn about formative assessment and then to explore with implementing this new knowledge in practice.

In the FAME model, most of the participants reported the importance of learning teams to their better understanding of formative assessment. Even though the survey did not ask them about their current understanding of formative assessment, coaches and LTMs recognized the contribution of the learning teams in their perceived learning. Our data analysis also suggests that having certain knowledge about formative assessment is a factor that influences the successful implementation of classroom formative-assessment practices. This may be related to the documented lack of preparation that teachers receive in classroom assessment practices (Athanases & Achinstein, 2003; Stiggins, 2006). Thus the sustained work in the learning teams helped coaches and LTMs to build a knowledge base that they can translate to new practices to implement with students. From that perspective, the statement of one LTMs who recommends to new participants in the FAME professional development "start small, learn first what is formative assessment, including examples; next, learn the process" makes sense and illustrates the importance of assuring adequate knowledge of formative assessment to support teacher learning and changes in practice.

Furthermore, there was a relationship for teachers between having a better knowledge of formative assessment and perceived learning of practical strategies and how to connect formative assessment with the curriculum. This suggests the importance of addressing formative-assessment theory as part of effective professional development models. Teachers

need understanding of the principles of sound assessment that impact student learning, especially to adapt practical ideas they are learning into their own contexts (Wiliam, 2006). Therefore, professional development should not conceive of formative assessment as a collection of tools and strategies to be used in the classroom, but as an ongoing process to making continuous adjustments in instruction according to the evidence collected. The FAME model takes this idea seriously; however, with local implementation of learning teams, the fidelity of this model is not certain. One of the challenges of professional development in formative assessment is balancing the learning needs of conceiving formative assessment as a core instructional process based on shaping classroom learning and instruction (Buck et al. 2010) and not overwhelming teachers with a collection of isolated strategies and tools. Moreover, schools must follow through with many programs or ideas over time and making learning of formative assessment compatible with other initiatives that the school district is prioritizing

Although teachers reported different types of learning, the team experience was especially important in helping teachers to learn about and implement practices such as providing descriptive feedback and setting learning targets, strategies that are more connected with their traditional teaching roles and are more controllable for them. This contrasts with the lower implementation of self- and peer-assessment, which are practices that are less compatible with traditional modes of teaching. Despite some learning teams that focused on the implementation of these important components of sound formative assessment and a few LTMs who described good classroom experiences when students used self- and peer-assessment, the implementation of these practices was lower. Probably, it was less successful because teachers require a substantial period of time to engage students (Ofsted, 2008) and students need to develop confidence to understand the learning targets and learn to

adequately use assessment criteria. No less important, students require understanding that involvement in self- and peer-assessment is meaningful and essential to regulate and manage their learning process.

When implementing classroom formative assessment, coaches and LTMs reported changes in perceived student motivation and involvement. Responses show that teachers perceive that some changes in students' learning and involvement can be attributed to the use of formative assessment. Even though the formative research literature (e.g., Black & Wiliam, 1998) recognizes the impact on students motivation, especially for low-achieving kids, more empirical research is needed to analyze the interrelationships among variables that affect student motivation and the impact of formative assessment on students.

The findings of the study describe how the implementation of a statewide professional development based on professional learning communities can impact teachers' learning of formative assessment as well as implementation of sound classroom assessment practices. However, a limitation of our study is that the findings are gathered from a self-reported survey administered at the end of the professional development. Research on effective professional development has posed the challenge of determining how teachers take what they have learned into the classroom (Thomas et al. 1998) and the relationships with student learning (Desimone, 2009). Therefore, we are interested in analyzing how teachers use formative-assessment practices in their schools and document instance of change in teacher and student learning (Authors, 2011). As part of these efforts, in addition to monitoring the process of learning and implementation of formative assessment of all teams throughout the state, through surveys, the FAME research team is currently collecting and analyzing video focused on the learning experiences of six learning teams in their meetings as well as gathering video of learning team members' implementation of formative assessment. We are

interested in linking data from multiple sources in order to understand the relationships among the professional development model, the interactions in the learning teams, and the implementation characteristics at the school and classroom level.

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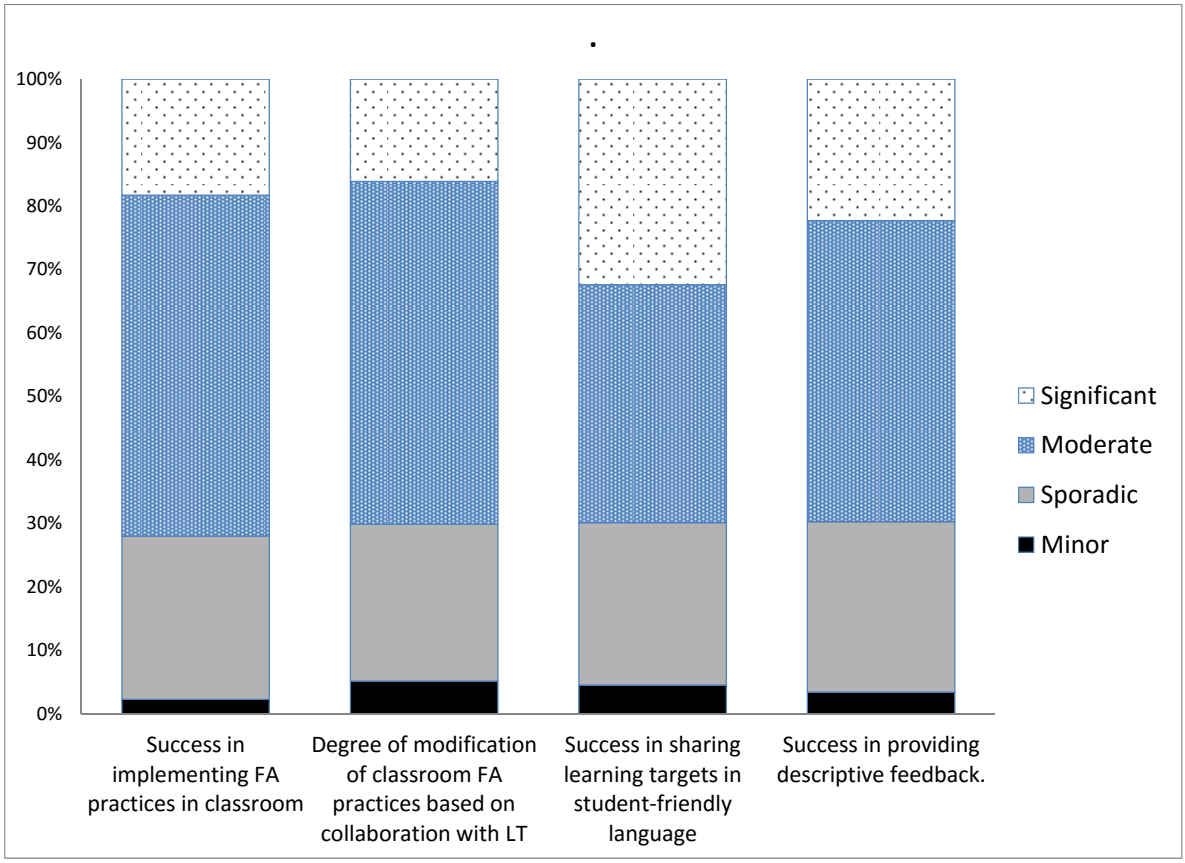

Figure 1. Levels of success for different classroom practices associated with implementation of the formative-assessment process.

Table 1

Results of Exploratory Factor Analysis

Scales	Factor 1	Factor 2
Success in implementing formative-assessment practices in the classroom	.723	
Degree of modification of classroom assessment practices based on collaboration with learning team members	.629	
Success in sharing learning targets in student-friendly language	.587	
Success in providing descriptive feedback to help students know what they should do next or meet assignments objectives	.576	
Learning team impact on participants' formative-assessment learning		.918
Learning team impact on participants' formative-assessment implementation		.498

Table 2

Significant Pearson Correlations Between kinds of Learning Reported by Coaches and LTMs (and their respective p-value)

	What formative assessment is	What formative assessment looks like	Practical formative-assessment instructional strategies	How to fit formative assessment into the curriculum
What formative assessment is		0.675 (p<0.01)	0.168 (p<0.05)	0.194 (p<0.01)
What formative assessment looks like	0.675 (p<0.01)			
Practical formative-assessment instructional strategies	0.168 (p<0.05)			0.330 (p<0.01)
How to fit formative assessment into the curriculum	0.194 (p<0.01)			

Table 3

Examples of open-ended responses which detail factors influencing classroom formative-assessment practices.

	LTM response
Time for implementing formative-assessment practices in the classroom	You need enough time to meet and implement. We have had many initiatives we had not planned on this year when we joined this item program added to our plan. I felt the time we had to meet was not sufficient to make a real difference in classroom practice. That said, I think level of awareness was built that can serve as a foundation for real change in practice.
Knowledge of formative assessment	(We had an) excellent coach who provided research-based articles for us to read and discuss. This gave credence to my formative assessment journey. My role as a coach has allowed me to learn about formative assessment in a much more thorough and helpful manner. I feel as if I have been in the biggest beneficiary on the team, but I would have liked to have had a chance to put some of the things I have learned into practice a classroom.

Table 4

Examples of open-ended responses with different perceptions about team makeup.

	LTM response
Content area/level of teaching	It was great to have dialogue through different buildings, grades, and content areas. This helped us tremendously to have different perspectives and the learning process
	We had a mixed group of participants from different grade levels, although I enjoyed the people in the group, I feel I would have benefited from a more homogeneous group. Teachers who taught the same grades and subject as me.
Presence of administrator	It was helpful to have administrators as part of the team. They provided great support to the teachers.
	I think having an administrator and a curriculum specialist stifled the conversation in our team meetings