

## Planning Professional Development: What Educators Know about Formative Instructional Practices

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*Formative instructional practices (FIP) are the formal and informal ways that teachers and students gather and respond to evidence of student learning. Although they might have been practicing formative instruction on a daily basis, many teachers rarely thought about how formative instructional practice features were already a part of their work. Teachers often displayed content standards, informed students of learning targets, and maintained learning records, but they may not have consistently analyzed records of student learning to make instructional decisions. Both novice educators and educators who already have strong classroom management and instructional skills are likely to benefit from professional learning around practices that encourage more student ownership of learning. In order to design a content relevant FIP PD program, it was critical to have an understanding of what teachers knew about formative instructional practices, and where their strength and weakness were. This study aimed to initiate these processes by asking, “What is educators’ baseline knowledge about FIP as measured by the FIP Knowledge Inventory?” The results of 2,528 educators on a FIP Knowledge Inventory showed an average of 61.84% correct responses or 15.46 points out of a possible 25 points. Item analysis indicated that teachers were weaker in two areas than they were in other principles of FIP: 1) providing effective feedback to students, and 2) promoting student ownership of their learning. This has implications for future teacher PD design and purposeful practices to transform knowledge to classroom instruction.*

### Introduction

Formative instructional practices (FIP) are the formal and informal ways that teachers and students gather and respond to evidence of student learning. This definition includes students as an active part of gathering and responding to assessment information. Formative instructional practices, sometimes referred to as the process of formative assessment or assessment for learning, are not a trend; these practices are supported by experts including Black and Wiliam (2010), Leahy, Lyon, Thompson and Wiliam (2005), and Marzano, Pickering and Pollock (2001). Decades of additional research have made it clear that formative instructional practices provide the foundation for effective teaching and learning (Stiggins, 2001).

FIP includes four core practices that research has shown to be among the most effective for improving student achievement. The four practices include the following:

1. Using clear learning targets;
2. Collecting and documenting evidence of student learning;
3. Providing effective feedback;
4. Preparing students to take ownership of their learning.

Although they might have been practicing formative instruction on a daily basis, educators may rarely have thought about how formative instructional practice features were already a part of their work. Teachers often displayed content standards, informed students of learning targets, and maintained learning records, but they may not have consistently analyzed records of student learning to make instructional decisions. Many did not purposefully align assessments to learning targets or student learning records and rarely provided descriptive, constructive, and timely feedback to promote student ownership of learning. A recent study on teacher growth in the use of formal and informal ways of gathering and responding to evidence of learning showed that even teachers who demonstrated high general classroom management skills had low performance on specific FIP such as maintaining a culture of student collaboration, encouraging student self-assessment, and supporting students in tracking their own progress (authors, 2016). Teachers who already have strong classroom management and instructional skills are likely to benefit from professional learning around practices that encourage providing more student ownership of learning (authors, 2016).

Educational leaders saw the need to heighten teachers' awareness of how effective the deliberate use of formative instructional practices are to their daily work. Funded by Race to the Top, the Department of Education in a Midwestern state launched the statewide implementation of a blended face-to-face/online teacher professional development (PD) project to apply formative instructional practices to enhance classroom instruction. Central to the planning and implementation of this FIP PD was an understanding of what teachers already knew about formative instructional practices and what their areas of strength and weakness were. Having clear information on their prior knowledge could aid in the design of relevant content and effective delivery for this FIP professional development project. This study aimed to initiate these processes by addressing the research question:

1. What is educators' baseline knowledge about formative instructional practices as measured by the FIP Knowledge Inventory?

### **Theoretical Framework**

Professional development is critical to ensure teacher professional growth and to enhance school capacity with high quality educators to transform learning into classroom instruction and improve student learning outcomes. One of the most important quality control features of PD design is its content relevancy. The content of any PD needs to be relevant, with applicability connected to teachers' needs and concerns (Desimone, 2009; Yap, Aldersebaes, Railsback, Shaughnessy, & Speth, 2010). Effective adult learning experiences, such as teacher professional development, must also incorporate basic elements of andragogy, or adult learning theory. As indicated by the basic elements of andragogy, in order to motivate and secure teachers' buy-in, a PD program must acknowledge experience that the adult learners bring to the experience, pique their interest in learning, and enable them to see how they can improve their skills in their current roles, all the while allowing for a degree of self-directed learning (Knowles, 1980; Terehoff, 2002).

Work by Clarke and Hollingsworth (2002), as well as Thurlings and den Brok (2017), described professional development implementation as a reflexive process that they outlined as an Interconnected Model with four distinct domains. The personal domain includes teacher knowledge, beliefs and attitudes. The other domains are practice, including teacher change, the

domain of consequence such as student outcomes, and the external domain, which reflects the teacher's learning environment and resources provided. Although describing professional development as a cyclical and reflexive growth network, the Interconnected Model showed teacher knowledge as a prominent part in the professional development process. Additionally, Guskey (2003) analyzed 13 lists published by national educational organizations and the US government in search of consistently cited characteristics of effective professional development. Results gathered from this wide variety of researchers and practitioners showed little agreement on what constitutes effective PD and at times lists contradicted one another. Yet, out of "21 characteristics distinguished in the lists, the most frequently cited was enhancement of teachers' content and pedagogical knowledge" (p.749). Thurlings and den Brok (2017), after conducting a meta-study, concluded as well that effective professional development should emphasize subject matter knowledge and pedagogical content knowledge. To inform a content relevant FIP PD design and effective delivery, it was critical to explore what educators knew and what they did not know on key FIP features and concepts.

A general overview of FIP describes it as "a process used by teachers and students during instruction that provides feedback to adjust ongoing teaching and learning to improve students' achievement of intended instructional outcomes" (McManus, 2008, p.3). This takes place in an environment in which teachers work collaboratively, parents understand what students are learning, school leaders support formative instructional practices, and students take ownership of their own learning process (Stiggins, 2001). Decades of research have made it clear that formative instructional practices provide the foundation for effective teaching and learning (Stiggins, 2001). Central to the formative instructional practices professional development program were four basic practices:

1. **Creating and Using Clear Learning Targets:** Effective use of formative instructional practices begins with the expectation that learning targets are used across all settings, are derived from standards, and clearly state what students need to know and be able to do, thereby driving the teaching and learning. The process of clarifying learning targets helps teachers 1) know what to teach, 2) know what to assess, 3) create a system for tracking and reporting information, 4) interpret and use assessment results accurately, and 5) know how to give effective feedback (Battelle for Kids, 2013). Clear learning targets help teachers share and clarify learning expectations with students, encouraging them to take responsibility for their learning (Chappuis, Stiggins, & Arter, 2012).

2. **Collecting and Documenting Evidence of Student Learning:** Collecting evidence helps teachers identify where students are in the learning process, confirm that students are moving forward, determine if the assessments match the objectives, and enable students to track their own learning. Collecting and documenting evidence of student learning can contribute to improved academic achievement because "accurate evidence of learning lets educators know which students are on track for meeting performance standards" (Joseph, Kastein, Konrad, Chan, Peters, & Ressa, 2014, p. 2). Ongoing, methodical collection and documentation of learning enables teachers to make essential needs-based instructional decisions and to offer students a view of their own performance patterns (Joseph et al., 2014).

3. **Providing Effective Feedback:** The hallmarks of effective feedback are that it is timely, specific, focused on the expected learning, actionable, and that it moves learning forward. Feedback can be a suggestion for intervention or it can cite success that points students to next

steps in the learning process. Feedback is only effective when learning moves forward, and, therefore, needs to be expressed in clear, constructive language that pinpoints students' needs and stretches them to close their learning gaps (Chappuis & Stiggins, 2002). Providing effective feedback can guide student performance in the right direction and ultimately lead to effective self-assessment (Chappuis & Stiggins, 2002). Motivation and desire to learn can increase when students feel that they are on track and that targets are within their reach (Wiliam, 2012).

4. Encouraging Student Ownership of Learning: Students demonstrate ownership through their ability to self-assess, provide peer feedback, and make informed decisions about their learning. Students learn to gather and use assessment information in order to understand how they learn best and know where they are in relation to the designated learning targets. They can then plan and take the next steps in their learning process (Chappuis et al., 2012). Students need to practice and build these skills over time.

In order to identify what is educators' baseline knowledge on Formative Instructional Practices (FIP), the researchers in this study developed a twenty-five item Formative Instructional Practice Knowledge Inventory based on the main concepts of formative instructional practices and Mertler and Campbell's In-service Teachers Classroom Assessment Literacy Inventory (2005). The inventory was developed to assess teachers' baseline knowledge and real-world classroom application of essential formative assessment concepts. Research into recognizing the role of prior knowledge in the learning process concluded that acknowledging prior learning is a key strategy to enhance skill development and motivate participation in learning activities (Miguel, Ornelas & Maroco, 2016). Based upon evidence underscoring the importance of recognizing prior knowledge and building upon it through professional development projects, researchers in the current study acknowledged that it was essential to establish teachers' baseline knowledge of formative instructional practices in order to determine their needs and allow PD providers to build upon existing knowledge.

In addition to establishing a baseline, another purpose for administering the FIP Knowledge Inventory was to compare inventory items that tested FIP knowledge to other items that required application of FIP to different classroom scenarios, indicating whether discrepancies existed between FIP concepts teachers knew and understood compared to what they could apply to different scenarios. Research has shown that teachers' learning of concepts or new practices frequently experience an "implementation dip," which refers to the inevitable struggle in trying to implement new skills as opposed to just learning about new skills (Fullan, 2007). Information about whether teachers had knowledge regarding formative instructional practices and if they understood how to apply them to instructional situations or whether they were showing signs of an implementation dip could serve as a guide for PD planning and delivery.

### **Research Method**

The initial data collection effort was to gather baseline data for a state initiated FIP professional development project. Evaluators and the state professional development program coordinators were interested in having documentation at the beginning of the project regarding participants' knowledge base in formative instructional practices.

Mertler and Campbell's In-service Teachers Classroom Assessment Literacy Inventory (2005) was the impetus for the FIP Knowledge Inventory instrument design. Mertler and Campbell's inventory

consisted of 35 items based on classroom assessment competency (Brookhart, 2001). A two-stage pilot test of the instrument was conducted with 152 preservice teachers in fall 2003 and 249 preservice teachers in spring 2004. The total mean of correct responses was  $M=23$ , with a  $SD=4.35$ . Item analyses of the second-stage pilot data revealed an overall instrument reliability (KR20) of .74. Item difficulty values ranged from a low of .212 to a high of .992; the mean item difficulty was equal to .681.

Adopting the same testing structure as Mertler and Campbell’s In-service Teachers Classroom Assessment Literacy Inventory (2005), the FIP knowledge inventory consisted of 25 items, with multiple choice responses for educators to select one most appropriate answer. Some items embedded school-based scenarios, featuring educators who were facing various assessment-related decisions. An example of one of the scenarios, including 4 multiple choices, is provided in the Appendix A gives an idea of the contextualized nature of the items as they appeared on the inventory. Items developed for the FIP Knowledge Inventory incorporated the four main FIP principles presented through a range of item difficulty, with varied cognitive levels and knowledge dimensions (Anderson & Krathwohl, 2001). Different cognitive demands were incorporated into the item development process, to ensure that questions probed beyond basic knowledge and comprehension of FIP terms and concepts. Participants earned 1 point for selecting the most appropriate response for each question, with a total raw score of 25 points equivalent to 100% accuracy. The inventory was piloted in a literacy instructional methods class with 23 in-service teachers who were directed to select one of four choices as the most appropriate answer to each question. Item analysis evaluated each item’s function and difficulty level. Minor revisions were made after the pilot to enhance direction and simplify the language for items identified by participants. The inventory was then converted to an online format. Preliminary item analysis results indicated a moderate interval consistency of  $r=.684$ . Item difficulty values ranged from a low of .212 to a high of .822; the mean item difficulty was equal to .561.

An online survey tool, Qualtrix, was used to deliver the online FIP Knowledge Inventory through designated local FIP contact persons in each district participating in the FIP PD program. Then the contact person in each district sent the link to district personnel via email. The target population was 17,357 educators enrolled in the FIP PD program. Respondents were asked to identify themselves as teachers, other teaching staff, or nonteaching staff. The survey link remained active for 3 weeks to allow participants time to respond. Among the 17,357 possible responses, 2,528 individuals replied to the online inventory, a 14.57% response rate. As indicated in Table 1, the largest proportion of respondents was teaching staff, totaling 90.9% of total respondents. Among the teaching staff, 30.4% identified themselves as elementary teachers, 13.1% as middle school teachers, 15.2% as high school teachers, and 31.8% as other teaching staff (e.g. intervention specialists, music teachers, ESL teachers, etc.). The 9.1% non-teaching staff included administrators, counselors, and other student service staff.

*Table 1 Respondents’ Distribution by professional role*

<b>Professional Role</b>	<b>Count</b>	<b>%</b>
<b>K-6 classroom teacher</b>	768	30.4
<b>6-8 content teacher</b>	331	13.1
<b>9-12 content teacher</b>	384	15.2
<b>Other teaching staff</b>	805	31.8

<b>Other- non-teaching Staff</b>	230	9.1
<b>Total</b>	2528*	100

\*7 participants did not identify their professional role in the survey

Figure 1. Respondents’ Distribution by professional role

The data was transported for statistical analysis after the survey site was closed. Descriptive statistics addressed the response trend by examining the percentage of correct responses to answer the research question. The average of correct responses was calculated out of the 25 possible points. Each of the 25 items was calculated to rank order its strength or weakness based upon the percentage of correct responses. Further, ANOVA analysis was calculated on each item and on the inventory as a whole to identify if there was a significant difference on the percentages of correct responses among grade bands and educator roles. In order to control for type 1 error because of 25 ANOVA analyses for each item, the significant p value was set  $p < .001$ .

### Results

Descriptive data analysis results indicated that among the participants who responded to the FIP Knowledge Inventory questions, the average of correct responses was 15.46 points out of the 25 possible points, or 61.84%. ANOVA analysis results of total correct responses indicated that there was no statistically significant difference in the mean of correct responses or percentage of correct responses ( $f = .786$ , and  $p = .534$ ) among grade level bands or between teaching and nonteaching respondents. These results demonstrated the response trend of the FIP baseline knowledge was the same among different grade bands and between teaching as well as nonteaching staff.

In order to delineate educators’ strengths and weaknesses in FIP knowledge, the average of correct responses for each item was computed and rank ordered to identify strengths and weaknesses in the designated FIP content areas. Overall, most of the educators’ correct responses were on items that reflected recall of general assessment literacy and using learning targets. Four out of 25 inventory items were correctly responded to by 90% or more of participants. These were recall level general assessment knowledge, not necessarily distinct formative assessment principles. For example, the highest scored item was question #13. It was an item to recall information that applied FIP principles presented in the online FIP modules yet was still reflective of general literacy, “When parents ask a teacher to explain the basis for their child's grade, what should the teacher do?” A full 95% of respondents answered it correctly. Overall, ten items to which more than 80% of participants responded correctly dealt with requiring participants to recall knowledge of general assessment literacy or basic FIP concepts such as clarifying learning targets. Ten other items had correct responses from fewer than 60% of participants. These items dealt with more complex practices directly grounded in formative instructional practice, such as providing effective student feedback and promoting student ownership of learning, or more cognitive demanding items that went beyond recall of knowledge. Table 2 presents the correct responses by percentages in descending order for each of the 25 items.

The response pattern indicating two areas of need were FIP based principles: providing effective feedback to students and promoting student ownership of their learning. For example, the lowest scored item was item #25, a question based upon a specific FIP principle detailed in one of the PD

modules, “Which is a characteristic of effective feedback?” Just 5% responded correctly. Another example, item #23, “According to the research cited in the modules, which of the following is true about student self-assessing and peer-assessing?” The lower performing questions (less than 60% correct) in the inventory were related to providing constructive feedback and encouraging students to use formative assessment and taking ownership of their own learning. It was noted that the lower performing questions also addressed evaluating or applying FIP knowledge. For example, item #20 and item #25 both asked about providing effective feedback. While 90% of the participants responded correctly for item #20, only 5% of participants responded correctly for item #25. Researchers noted that item #20 item could be addressed with more general knowledge of assessment literature, while item #25 included specific FIP content covered in the online PD modules that required deeper knowledge about the application of FIP.

*Table 2. Number of Correct Responses and Percentages for the FIP Knowledge Inventory in Descending Order*

<b>Item Statement</b>	<b>F Correct Response</b>	<b>%</b>	<b>Std. Deviation</b>
Q 13. When a parent asks a teacher to explain the basis for his or her child's grade, what should the teacher do?	2393	0.95	0.23
Q 20. Which of the following examples is the best example of	2273	0.90	0.30
Q 3. Which of the following would be considered formative	2220	0.88	0.33
Q 11. Ms. Campos is starting a factoring unit in her Algebra I class. Before beginning the unit, she gives her students a test on the commutative and distributive properties of addition and multiplication. Which of the following is the most likely reason she gives this test?	2200	0.87	0.34
Q 5. What is the most effective use a teacher can make of an assessment that requires students to show their work (e.g., the way they arrived at the solution to a problem)?	2121	0.84	0.37
Q 6. A teacher wants to document accuracy of a classroom assessment she plans to use for assigning grades on a class unit. What kind of information would provide the most accurate evidence for this purpose?	2115	0.84	0.37
Q 19. Which of the following would be classified as a learning target rather than a learning activity?	2099	0.83	0.38
Q 9. Students in Mr. Chen's science class developed a model of the solar system as one of their assignments. Which scoring procedure below would maximize the objectivity of assessing these projects?	2062	0.82	0.39
Q 1. According to the modules, which of the following best explains the most essential purpose for clearly sharing learning targets?	2056	0.81	0.39
Q 22. According to literature cited in the modules, what distinguishes formative instructional tasks from other kinds of activities?	2029	0.80	0.40
Q 21. Which of the following is NOT a feature of peer assessment?	1929	0.76	0.43

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Q 24. According to the research cited in the modules, which of the following techniques does <u>not</u> promote student learning?	1926	0.76	0.43
Q 12. Which of the following practices is most likely a summative use of assessment?	1733	0.69	0.46
Q 14. Which of the following grading practices results in a grade that <u>least</u> reflects students' achievement?	1688	0.67	0.47
Q 18. Based upon content in the FIP modules, what is the first step in crafting clear learning targets?	1671	0.66	0.47
Q 7. Mrs. Rivera plans to develop an end-of-unit assessment for her 9th grade social studies class. Which of the following would most likely increase the quality of Mrs. Rivera's assessment?	1382	0.55	0.5
Q 2. In a class activity, students are asked to use different colored highlighters to identify facts and opinions in an article about candidates in the upcoming election. This type of activity could be considered an example of:	1367	0.54	0.5
Q 17. Mr. Klein bases his students' grades mostly on graded homework and tests. Mr. Harb bases his students' grades mostly on his observation of the students during class. A major difference in these two strategies for assigning grades can best be summarized as a difference in ...	1304	0.52	0.5
Q 4. Mrs. Bruce wants to assess her students' understanding of the method of problem solving she had been teaching so she can adjust her instruction. Which assessment strategy below would enable her to do that?	1188	0.47	0.5
Q 10. Based on formative instructional practice literature, which of the following is regarded as one of the three high-impact instructional practices?	1056	0.42	0.49
Q 15. Ms. Khan assigned grades based upon percentage points earned on daily homework and one end-of-unit test. Which of the following is the major criticism regarding how she assigned the grades?	902	0.36	0.48
Q 16. According to the modules, which one of the following is considered an assessment <i>method</i> ?	770	0.3	0.46
Q 8. Ms. Nguyen wants to assess her students' skills in organizing ideas rather than just repeating facts. Which words should she use in formulating essay exercises to achieve this goal?	267	0.11	0.31
Q 23. According to the research cited in the modules, which of the following is true about student self-assessing and peer-assessing?	221	0.09	0.28
Q 25. Which of the following is a characteristic of effective feedback?	114	0.05	0.21

. Item # 25 (the lowest item with correct percentage) was not statistically significant ( $f=.982$ ,  $p=.578$ ) by grade band and educator role

\*indicates items that were significantly different by grade band and educator role



Table 2. Number of Correct Responses and Percentages for the FIP Knowledge Inventory in Descending Order

Twenty-five ANOVA analyses (one for each item) were conducted to further examine if differences exist among grade band and educator role on each items level responses. Three items turned out to be statistically significantly different, items #8, #11 and #12 ( $f=$  4.543, 7.266 and 5.264 respectively) and  $p < .001$ . Table 3 presents the specific correct response percentage for these three items. Professional roles marked with \* indicated statistically higher correct percentages.

Table 3 Item Level Correct Response Percentage Differences by Professional Role

Professional Role	Item # 8 F & Percentage of Correct Response	Item # 11 F & Percentage of Correct Response	Item # 12 F & Percentage of Correct Response
Non-Teaching Staff (Administrator, Counselor, FIP Lead)	29 (1.16%)	219 (8.67%)	191 (7.56%)
Other Teacher (Intervention SP, PE, Music, EL)	71 (2.82%)*	629 (24.89%)*	477 (18.88%)*
Grade K-6 Teacher	74 (2.94%)*	692 (27.28%)*	500 (19.79%)*
Grade 6-8 Teacher	29 (1.16%)	341 (13.49%)	271 (10.72%)
Grade 9-12 Teacher	64 (2.53)	318 (12.58%)	293 (11.59%)
<b>Total</b>	<b>267 (11.00%)</b>	<b>2199 (87.02%)</b>	<b>1732 (68.54%)</b>

\*Indicated  $p < .001$

Table 3. Item Level Correct Response Percentage Differences by Professional Role

The pairwise comparison of the correct response percentage for items 8, 11, and 12 indicated that grades K-6 teachers and other teachers such as intervention specialists as well as physical education, music, and ESL teachers seemed to score significantly higher than their peers in other professional groups. It is worth noting that just 11% of respondents answered item #8 correctly while 87% answered item #11 correctly.

### Discussion

The 2,528 educators responding to the FIP Knowledge Inventory showed what they knew at the beginning stages of the FIP professional development project and highlighted their overall strengths and areas of need regarding formative instructional practices. The four lowest scoring questions related to content and skills regarding effective feedback and student ownership of learning. These questions also required varied cognitive demands and knowledge dimensions. Therefore, understanding and implementing effective feedback and student ownership of learning were indicated as relatively weak areas needing deliberate PD focus. Even though many participants were experienced educators, they still showed room for improvement in applying FIP, especially in encouraging constructive feedback and student ownership of learning, regardless of grade level or educator role.

Kisa & Correnti (2015) stated that when teachers are learning a complex skill or strategy, acquiring the necessary knowledge is not as difficult as implementing and using the skill. Based upon research that teachers are often more successful in mastering the content aspects of an innovation as opposed to the processes, the researchers in the study considered this transition from knowledge to implementation a possible explanation for why participants missed more complex items that required applying or synthesizing formative instructional practices.

Much research into PD initiatives indicates that “the central focus of current professional development efforts most closely aligns with the ‘change as growth or learning’ perspective” (Clark & Hollingsworth, 2002 p. 948). With this in mind, having relevant background knowledge ultimately leads to promoting teachers’ readiness to learn, an essential factor for successful adult learners (Knowles, 1980; Thurlings & den Brok, 2017) which can lead to the “individual nature of teacher professional growth” (Clarke & Hollingsworth, 2002, p. 965). Results of the inventory gave PD providers data they needed to plan with an eye toward teachers’ areas of strength and areas of need.

Recent work indicates that identifying and acknowledging prior knowledge when embarking on a professional development program can lead to new learning (Clarke & Hollingsworth, 2002; Miguel et al., 2016). Additionally, completing the inventory gave participants “the opportunity to remember and reflect” on what they already knew about formative instructional practices which “could lead to transformation and learning from experience” (Miguel et al., 2016, p. 182), thereby making the inventory a learning opportunity for participants as well as a diagnostic tool for PD providers.

Insights into participants’ familiarity with FIP concepts and application allowed PD planners to organize experiences that could stretch participants professionally by guiding them in the application of formative instructional practices. Results showed that on three items that required basic FIP knowledge, K-6 and “other” teachers (who frequently have a more general K-12 preparation and inservice training) scored higher than grades 6-12 teachers, whose preparation training frequently focuses on more content specific preparation. This could be a reflection of some of the features of the Interconnected Model, mentioned previously in this article, specifically the domain of practice, which includes teacher change, and the external domain, a reflection of the teacher’s learning environment and resources that are provided, including professional development opportunities. FIP professional development targeted for these different roles could reflect such differences.

### **Educational Significance**

Results of this study indicated that by using a knowledge inventory such as the FIP Knowledge Inventory, PD providers can gather and use documentation of teachers’ prior knowledge to purposefully structure and direct professional development. Responses to this inventory led PD providers to organize ongoing experiences that emphasized content about providing effective feedback to students and encouraging student ownership of learning, which may ultimately help educators implement all FIP principles more completely and expand students’ roles in their own learning. To go further, PD providers also could consider how to sustain PD beyond the initial project by incorporating additional opportunities for teachers to work more closely and observe, provide feedback, and answer questions for one another through coaching or teacher collaboration, and thereby increase occasions for developing skills in areas of need (Parise & Spillane, 2010).

Analysis of this inventory suggested that even as teachers become more proficient using formative instructional practices, carefully structured emphasis or clarification on how formative practices align with their strengths and communicate student progress are needed if teachers are to successfully heighten students' ability to be more active and more confident in monitoring their own learning.

In addition to considering the results of the knowledge inventory, PD providers need to put forth effort to help educators see themselves as learners and determine their personal needs and concerns (Desimone, 2009) regarding formative instructional practices. Providers must also consider that in spite of differing local implementation plans, organizational structures, priorities, and resources, blended learning has the potential to impact teacher practice if implemented with fidelity and supported by instructional coaching and teams. Providers should consider, even within blended learning experiences, how they can carefully structure the use of collaborative, face-to-face learning, and possibly a move toward teacher teams (Parise & Spillane, 2010), as an essential part of the blended learning model. PD providers might also consider how to recognize teachers' self-identified concerns, even beyond a knowledge inventory such as this one, and incorporate teachers' input into an organized plan with clearly defined roles for all participants.

PD planners must also be aware that simply providing materials (such as face-to-face sessions, online modules, and facilitator guides) is not sufficient to guarantee fidelity to the implementation plan or uniform, consistent changes in instruction (authors, 2015). The characteristics of regional and local providers, organizations responsible for implementation, program participants, and the community in which implementation occurs affect implementation fidelity, thus yielding different results (authors, 2015). Providers would benefit from acknowledging that effective PD is "well organized, carefully structured, and purposefully directed" (Guskey, 2003, p. 749) in order to be effective and achieve closer adherence to the design. Evaluations of initiatives should also include measures of fidelity in implementation.

The FIP Knowledge Inventory scores also indicated that specific formative instructional practices are not "second nature" to teachers, and perhaps not entrenched in teacher education programs the way more general teaching skills are. This would suggest that embedding FIP strategies into pre-service teacher education may provide more opportunities for exposure and practice that will translate to later classroom practice.

### **Limitations**

Researchers acknowledge possible limitations in this study. For one, wording of questions and answers was not documented as a variable in selecting or scoring responses. Although the inventory was piloted, no significant feedback on the wording of items was mentioned. Unfamiliar FIP language or terms in question items may have affected responses since this inventory was administered before the professional development was provided. It was possible that participants knew some of the concepts, but with different terms.

Collection and reporting of demographic data was limited in order to assure participants of confidentiality. For that reason and in consideration of the limited response rate, researchers did not address whether responses clustered by years of teaching experience, professional background or training, district, teacher age, etc.

The voluntary response rate of about 15% was fairly low and may not have represented the actual statewide teaching population or the overall statewide previous knowledge of formative instructional practices. A larger sample may have produced different results.

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