

ASSESSING ASSESSMENT: THE IMPACT OF FORMATIVE ASSESSMENT
TRAINING ON SCIENCE TEACHER CLASSROOM METHODS

by

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ABSTRACT

Formative assessment is a different way to evaluate student needs and is unique from traditional summative assessment in both implementation and outcome. In short, formative assessment takes place during the process of learning rather than simply judging how much knowledge was gained after the process is over. While previous studies have generated promising data supporting formative assessment, adoption of the technique by classroom teachers can suffer from a lack of training and support. To understand the role of university training in formative assessment, a cohort of teachers enrolled as graduate students participated in pre and post-treatment surveys and interviews. In this case, “treatment” was EDCI 504 Evaluation and Measurement in Education. The cohort represented the experience and attitude of participants enrolled in the course, after the completion of the course and retrospectively, one to three years later. The data showed that the course directly influences the participant’s teaching practices and frequency of formative assessment use in the classroom. The gradual increase in use up through a retrospective group demonstrated that formal university training in these methods can give rise to new evaluative practices.

INTRODUCTION AND BACKGROUND

For the past five years, I have been working in the field of informal science education. I never worried much about grading my students because it was a rare occurrence if I saw them more than once. I was typically an educator for their fieldtrip or an outreach class. However, as formative assessment became more common in the informal science education world, I needed to develop ways to quantify the impact of some of the grant-funded programs that I was directing. Initially, pre and post-tests were my go-to evaluation tool. After taking EDCI 504 Evaluation and Measurement in Education through Montana State University's Master of Science in Science Education (MSSE) program, I started to incorporate new assessment strategies and tools to my evaluation efforts.

The MSSE program is a unique interdisciplinary effort that allows students to take classes by distance learning asynchronous, computer-mediated communication (<http://www.montana.edu/msse/About>). The MSSE program attracts participants from across the country and around the world. While most of the participants are classroom teachers, the program also supports informal science educators like myself. The MSSE program is a 30-credit program with 12 of those credits coming from a set of core classes, the first of which is EDCI 504.

Formative assessment is introduced to MSSE participants in EDCI 504. It is done with a variety of assignments throughout the course that encourage the participants to try evaluative methods that they had not used previously. This course asked teachers to step away from typical summative evaluation, such as administering a test at the end of a unit

and instead encouraged teachers to use formative assessment, which can help inform teaching decisions and the design of curriculum (Dirksen, 2011).

My past experience as a student in the MSSE EDCI 504 class shaped the way that I use formative assessment and the way in which I interact with my students. During EDCI 504, we not only learned about formative assessment but we also implemented different assessments into our current lessons at the time. It was this change in both my teaching and assessment skills that lead me to my capstone topic.

The purpose of this study aimed to examine the extent to which the formative assessment training, developed in the MSSE courses, influences teacher classroom practices over both the short and long term. To determine short-term changes, I evaluated 16 students in John Graves's 504 class in the fall of 2011 and followed up with the 13 of the same students during the spring of 2012. To determine long term changes, I evaluated the 10 students in John Graves's 509 class during the fall of 2011, where most of the class had taken 504 the previous year or earlier.

CONCEPTUAL FRAMEWORK

There is no denying the critical role that formative assessment can play in a student's learning process. Formative assessment can serve many functions in the classroom. First and foremost, it can be used to assess student needs and progress. It can also be used to design and adjust instruction during the learning process. Furthermore, it can help teachers design programs that are more refined and effective in promoting a student's educational goals (Herman, Osmundson, Ayala, Schenider, & Timms, 2006).

Formative assessment can be defined as assessment for learning and not as an assessment of learning (Ruiz-Primo & Furtak, 2007). This is quite different from summative assessment which is administered after the teaching and learning is done. This doesn't give the students time to improve their learning nor does it give the teacher time to adjust their teaching. Formative assessment allows teachers to generate feedback and data about the current needs and progress of their students. The information that is obtained gives the teacher the chance to change, improve, refine, or accelerate the topic he or she is currently teaching to better meet student needs (Nicol & Macfarlane-Dick, 2006; Herman et al., 2006). Teachers who utilize formative assessment are able to negate some of the randomness and inefficiency of trial-and-error teaching (Sadler, 1989).

Formative assessment can take many different shapes ranging from the simplistic to complex. Formative assessment tools such as muddiest point, pre/post surveys, minute papers, and misconception probes need to be developed through specific training, while there are other tools most educators already possess and may already use on a daily basis (Angelo & Cross, 1993). Something as simple as observing student expressions can give the teacher a great deal of formative information (Dirksen, 2011). Regardless of whether a teacher uses a simple technique or a complex one, formative assessment will yield the most information when it is treated like an integral and important component of teaching and not as an afterthought. When teachers have the time and training to fully incorporate formative assessment successfully, the students end up developing a better understanding of what is expected of them as well as what needs to happen for them to meet those expectations (Lazy & Yadin, 2010).

Supporters of formative assessment insist that it helps students develop a deeper understanding of the topic they are studying. It helps create life-long learners and gives the students the power and skills to begin to analyze their own learning and find ways to improve in an independent environment. It does this by turning the student from a passive learner into an active learner, it gives them the chance to set their own goals and often monitor their own success (Clark, 2011). Additionally, one study revealed that low-achieving students made notable improvements when teachers used formative assessment (Black & Wiliam, 1998).

There are also challenges to formative assessments. For example, both teachers and school administrations may have limited funding and training to support proper formative assessment training. Formative assessment by itself is not magical. It needs to be implemented and the information collected needs to be properly reviewed. Even if formative assessment is taking place in the classroom, the results are seldom shared and thus the process is rarely peer reviewed. Formative assessment by nature allows teachers the flexibility of making up and executing an assessment on the spot, however without proper follow up and synthesis of the information by the teacher, the assessment cannot be considered a success. A successful formative assessment produces information that can be used to evolve both the teaching and the learning to better suit the students needs. The implementation of formative assessment, how the data is used and what influences it has had on the classroom as a whole is still understudied (Black & Wiliam, 1998; Herman et al., 2006; Herman & Gribbons, 2001). Furthermore, another challenge that teachers who use formative assessment face is the No Child Left Behind Act (NCLB). NCLB placed extra pressure on teachers to use summative assessment and raise student

test scores. This has slowed and overshadowed the implementation of formative assessment (Clark, 2011).

Furthermore, a significant shift in attitude and training for both students and teachers may need to happen for formative assessment to become pervasive and successful. The traditional idea of the teacher being the soul disseminator of knowledge and the students being the passive receptor will need to be readjusted. Instead, both teachers and students need to be actively involved and invested in the formative assessment techniques. Teachers need to be trained to formulate and interpret assessments. Additionally, the teachers will need to teach the students the skills to assess their own work (Louie, Cazadon, Sanchez, Melo, North, & Kagle, 2011).

It was argued that the only way to successfully raise student achievement is to improve the quality of teacher education and preparedness (Wiliam, 2007). This is accomplished by increasing the amount of training and support teachers need to become confident in integrating formative assessment into their classroom. It was shown that teachers who meet once a month to share formative assessment ideas and results, ideally in groups between eight to ten participants in size, saw positive changes in their classroom. This argues that formative assessment is very powerful and can create dramatic changes in student achievement, but for this to happen teachers need to make long-term changes in their classroom practices. Something as simple as adding a few more seconds to the wait period after one asks a question to a group can be a long and frustrating change for an experienced teacher to make. However, these teacher learning communities provide teachers an environment where they can share ideas and garner support from one another (Wiliam, 2008).

Some critics see formative assessment as fast, informal, and something that does not require much training, however, that could not be further from the truth. In fact, it takes the teacher's time and practice to develop effective formative assessment techniques and strategies. Then, these need to be properly and purposefully integrated into a lesson to gather the most information (Sawchuk, 2011).

A Vermont and New York case study examined two state-supported formative assessment initiatives and found that students and teachers responded positively to the initiative and both were interested in continuing the use of formative assessment (Louie et al., 2011). The state showed support and not only trained classroom teachers in the state of Vermont but Lead Teachers for the program, Principals, District Leaders, and State Agency Leaders. The training ranged from two-day summer institutes facilitated by a professional Educational Testing Services company, which employed a formative assessment expert, to monthly meetings and ongoing support (Louie et al., 2011).

The National Center for Research on Evaluation, Standards, and Student Testing (CRESST) looked at three different middle school mathematics formative assessment programs (Frohbieter, Greenwald, Stecher, & Schwartz, 2011). The desired outcome was to identify which program worked best for both teachers and students, so that in the future it would be easier for teachers and administrations to know what formative assessment programs to adopt and invest both time and money. Ultimately, the differences in the programs were harder to identify than they originally thought. This was due to the considerable variation in regards to what information the teachers adopted from the different programs and how they implemented it. What the study did make very clear was that the teachers overall comfort with the formative assessment program, either

through training or practice, was the deciding factor in regards to how well formative assessment was integrated into the curriculum. Furthermore, the teachers in this study preferred the programs that provided them with pre-existing assessments.

Unfortunately, teacher development in formative assessment cannot be easily measured because one needs to take the teacher's environment into consideration (Wiley, Lyon, & Goe, 2009). Beyond the training, teachers need sustained time and support to become proficient in formative assessment techniques and put them to work. Administrations need to know what they are getting into and if they can offer the sustained support that will be needed for teacher success. Key points listed below must be addressed:

- The implementation of formative assessment may result in changes to both the explicit classroom rules and implicit classroom expectation.
- Formative Assessment might interrupt other classroom/school policies.
- Formative assessment has a critical student component and impacts more than just what the teacher does.
- Engaging teachers in formative assessment can be a powerful way to reenergize experienced teachers (Pinchok & Christopher, 2009, p. 14).

Both support and understanding need to be addressed before the teachers can move forward with formative assessment techniques. Even high achieving teachers can feel as if they are in "no-man's land" when formative assessment becomes contradictory to the traditional summative assessments that both the teacher and his or her students were previously measured. When teachers and students are both accustomed to being judged

against a certain framework, it is challenging to change and easy to revert back to old ways of teaching (Callingham, Pegg, & Wright, 2009).

Teachers and administrations have a unique opportunity to take advantage of The Race to The Top Assessment Program and begin to implement formative assessments into their classroom. This implementation will need sustained support and will require teachers to change their classroom practices. While that may be difficult in the near future, the research supports this change. Some argue that educators and administrators will be doing their students a disservice if they don't change (Heritage, 2010).

METHODOLOGY

The subjects of this study were students of Montana State University pursuing a Masters of Science in Science Education. I worked with 16 students who were participating in EDCI 504 Evaluation and Measurement in Education during the fall of 2011, however only 13 of the original 16 participated in the follow up survey. Additionally, I worked with 12 students that were enrolled in EDCI 509 Implementing Action Research in Teaching and Learning during the fall of 2011. These 509 students had participated in the same EDCI 504 course with the same Professor, in spring of 2011 or earlier. This consistency allowed me to compare and contrast answers from both EDCI 504 and EDCI 509.

Data was collected through online surveys administered through the use of Survey Monkey (<http://www.surveymonkey.com/>) and interviews conducted through phone conversations during the fall of 2011 and winter of 2012. All participants read the informed consent form and agreed to participate in my project (Appendix A).

Additionally, the research methodology for this project received an exemption by Montana State University's Institutional Review Board and compliance for working with human subjects was maintained.

During the fall of 2011, 16 students enrolled in EDCI 504 completed the 504 Formative Assessment Survey and during the spring of 2012, 13 out of the original 16 students completed the same 504 Formative Assessment Survey as a follow up (Appendix B). The 504 Formative Assessment Survey was used to gather baseline data on the participant's confidence and utilization of formative assessment in the classroom. The results of the survey were analyzed using a Likert Scale: *4 = very, 3 = somewhat, 2 = not very, 1 = not at all; 4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree*. The mode of the values was used to measure results for both the pre- and post-treatment survey. This comparison allowed evaluation of any short term changes in the teacher's classroom practices.

Additionally, two students in EDCI 504 participated in phone interviews during the Spring of 2012 (Appendix C). The participants were asked five questions about formative assessment. The first interview question was a numerical scale 1-10 to gather quantitative data on the participant's understanding of formative assessment. The remaining four questions provided qualitative information that was used to support the numerical data generated by the 504 Formative Assessment Survey.

To measure the long term impact of formative assessment training on teacher classroom practices, I surveyed 11 students in EDCI 509 during the Fall of 2011. The participants completed the 509 Formative Assessment Survey online (Appendix D). The results of the survey were analyzed using a Likert Scale: *4 = very, 3 = somewhat, 2 = not*

very, 1 = not at all; 4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree.

The mode of the values was used to measure the results. The participants were also asked what formative assessment tools they are currently use in the classroom, as well as how completing EDCI 504 has influenced how they assess their students. A summary of my data collection methods can be found below (Table 1).

Table 1
Triangulation Matrix of Methods

	Data Source 1	Data Source 2	Data Source 3
Confidence and Utilization of Formative Assessment in the classroom - 504	Pre - Survey: Fall 2011	Post - Survey: Spring 2012	Phone interview: Spring 2012
Short term impact - 504	Pre - Survey: Fall 2011	Post - Survey: Spring 2012	
Long term impact - 509	Survey: Fall 2011		

In addition to the Likert Scale questions, the 504 Formative Assessment Survey and the 509 Formative Assessment Survey also asked the participants to list all of the formative assessment tools they were currently using in their classroom as well as what they planned on using during the next semester. I compiled the responses from all three-survey groups and then sorted and ranked the most popular responses. The participants were allowed to list as many formative assessment tools as they wished. Furthermore, I sorted the top three responses by group preference. This allowed me to see which

formative assessment tools each of the three groups utilized more frequently. Lastly, I looked at each survey group as a cohort and ranked their top responses.

The participants were also asked to quantify how many times a week they use formative assessment in their classroom. This same question was asked on the 504 Formative Assessment Survey, 504 Post survey, and in the 509 Formative Assessment Survey. The results were averaged for each group and then compared against each other to see the long and short term changes in regards to the implementation of formative assessment in the classroom.

DATA AND ANALYSIS

The results of the short and long term impact of the EDCI 504 assessment course, as measured by weekly use of formative assessments, indicated that the 504 pre-treatment group members were using formative assessment 1-3 times per week, with an average of three times per week ($N=16$). The 504 members group post-treatment, just a semester later, were using it 1-5 times per week, with an average of 3.5 times per week ($N=13$). The 509 group members, that has previously taken 504, were using it 1-5 times a week, with an average of 4 times per week ($N=12$). This shows an increase in the average use of formative assessment between the pre and post-treatment 504 group, as well as an increase from the 504 post-treatment group to the 509 group (Figure 1).

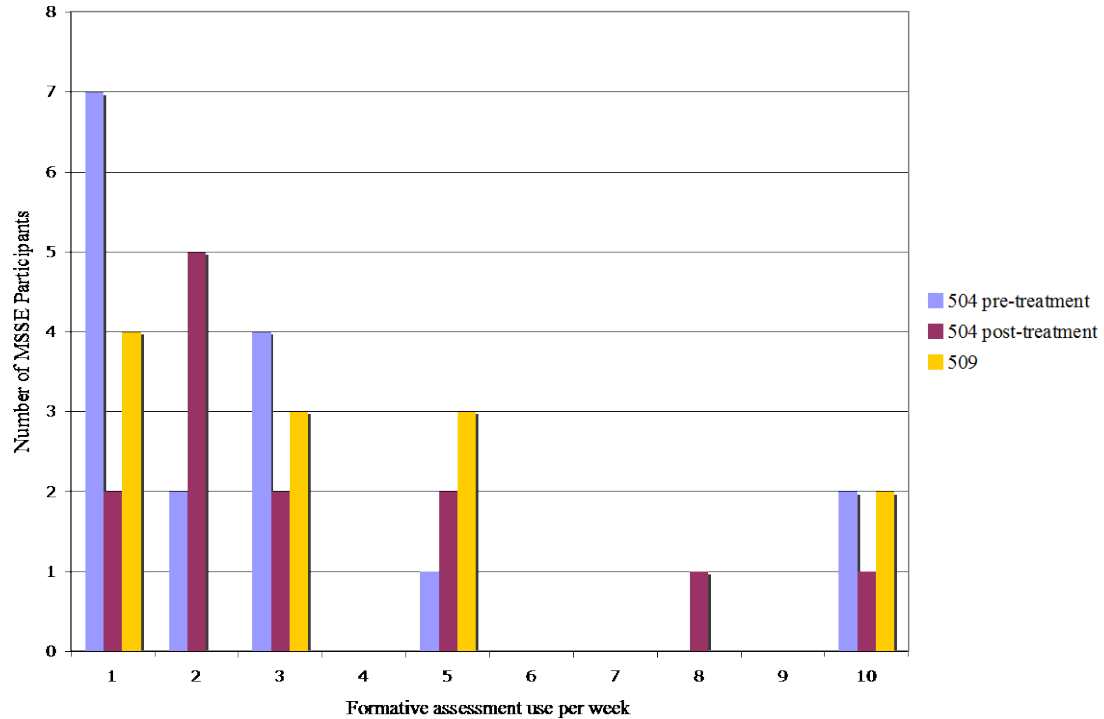


Figure 1. The number of times per week teachers used Formative Assessment in their classroom, (504 Pre $N=16$, 504 Post $N=13$, 509 $N=12$).

When queried for the most common formative assessment practices used in their classrooms, the participants gave a range of responses. Of the 41 total participants, the minimum response was one formative assessment tool and maximum was seven formative assessment tools per participant. The average number of formative assessment tools listed by each participant was 3.3. The top 12 responses from the 504 pre and post-treatment group and the 509 group were determined (134 total responses) (Figure 2).

The three most commonly used formative assessment tools were the muddiest point exercise, which 17% of the participants used in their classroom; the pre/post surveys, which 15% of the participants used this in their classroom; and the minute paper exercise, which 14% of the participants used in their classroom. Each of the three survey groups favored a different tool overall. The 504 pre-treatment group preferred the

muddiest point tool; 58% of those that used the tool were from this group. However, just a semester later, the 504 post-treatment group preferred the pre/post survey tool; 60% of those that used that tool were from that group. Lastly, the 509 participants favored the minute paper; 56% of those that used that tool were from that group.

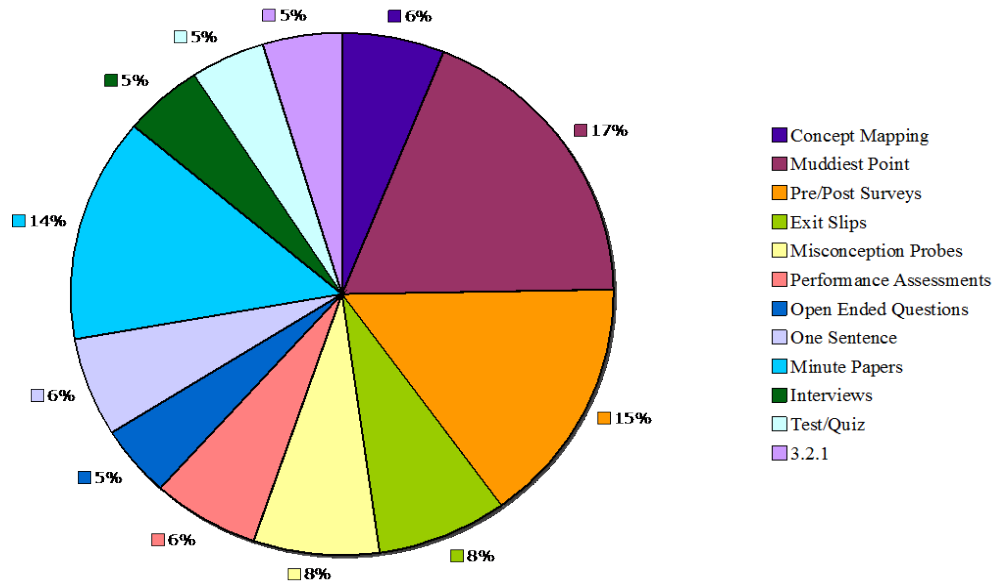


Figure 2. Top 12 formative assessment tools used in the classroom by 504 participants pre-treatment, 504 participants post-treatment, and 509 participants ($N=41$, 134 total responses).

To determine what each individual survey group utilized in terms of formative assessment tools, I looked at each group's responses independently. The 504 pre-treatment group preferred the muddiest point tool 24% of the time, followed by pre/post surveys 14% of the time (Figure 3). However, just a semester later, the 504 post-treatment group used the pre/post survey tool 30% of the time, followed by the muddiest point tool 15% of the time (Figure 4). The 509 participants preferred the minute paper 28% of the time, followed by the 3-2-1 exercise 18% of the time (Figure 5).

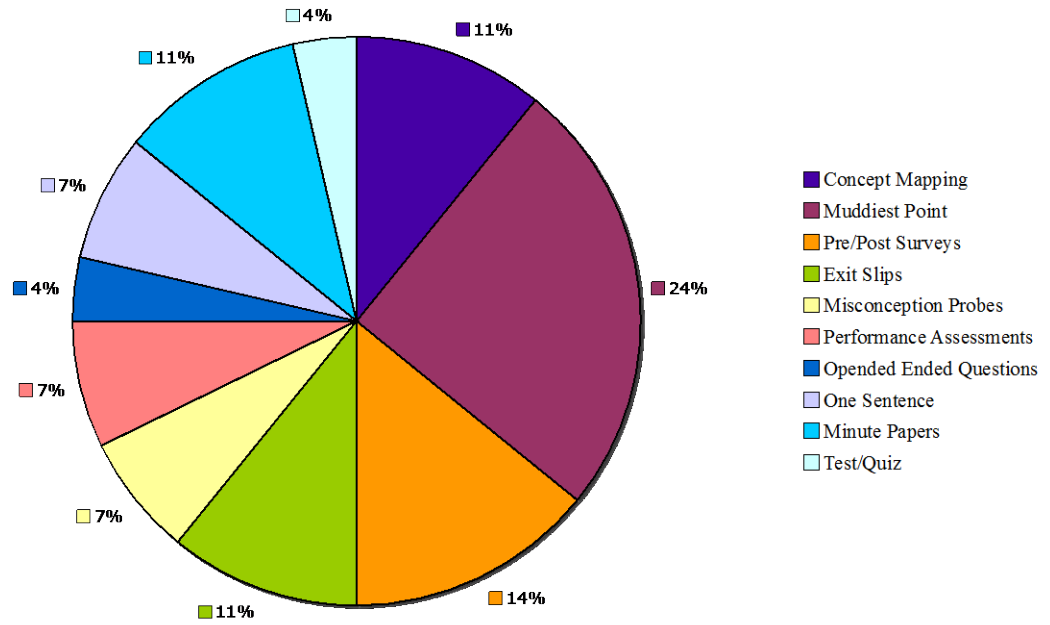


Figure 3. The top formative assessment tools used by 504 participants pre-treatment (N=16, 54 total responses).

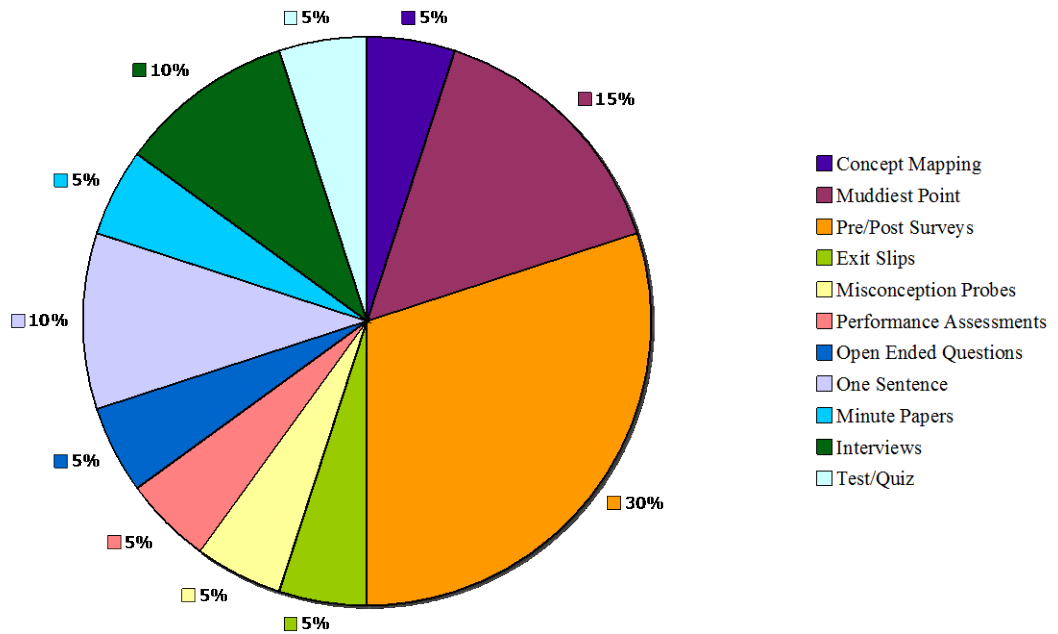


Figure 4. The top formative assessment tools used by 504 participants post-treatment (N=13, 44 total responses).

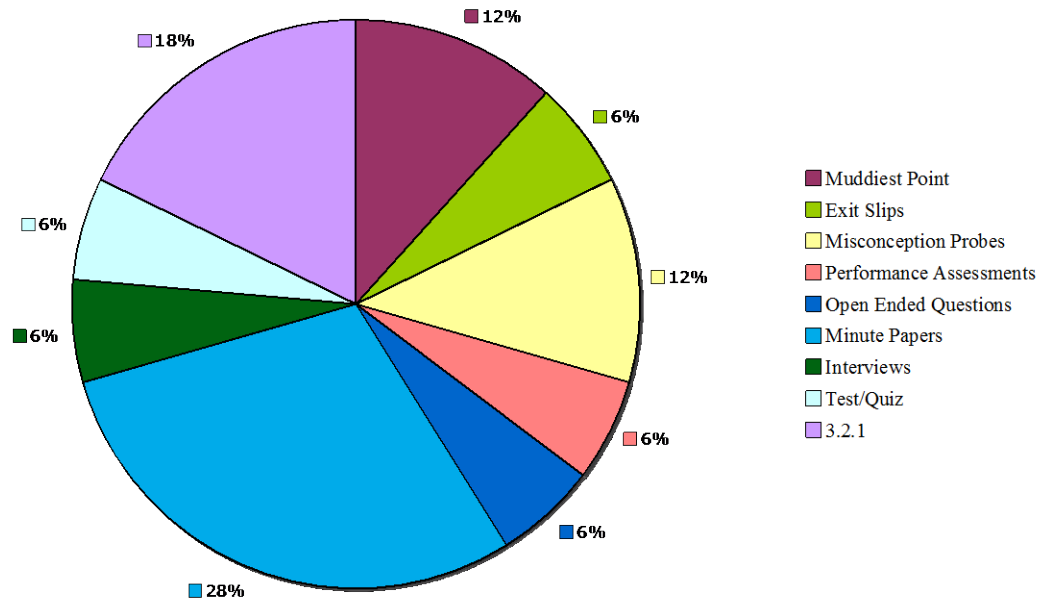


Figure 5. The top formative assessments tool used by 509 participants ($N=12, 36$ total responses).

Even though the data clearly suggests that there were a few formative assessment tools that were favored by the participants, the majority of the participants listed more than one tool. One participant wrote, “I use misconception probes, individual interviews, minute paper, 3-2-1, quick write, etc. Basically different types of CATs, but these are the most common. I really find the misconception probes and interviews to still be the most effective.” I asked the 504 pre and post-treatment participants what formative assessments they planned to use the next semester and the majority listed the same ones that they were currently using.

Another participant reiterated the fact that formative assessment can take many different forms and is not limited to the specific techniques and tools that were learned in

EDCI 504. That participant wrote, “I always do a review at the beginning of class so I can see how my students are doing and what information they are retaining. These usually aren't specific strategies that we practiced in 504, however. The assessment can take the form of using small white boards and asking various questions; having the students pair up and tell each other what they know while I walk around and listen in; or sometimes I give them some warm-up problems that I check over before we start anything new. Other times I will also give a ‘pop quiz’ of a few problems and then I split up those that got it right and those that didn't in order to differentiate.”

I asked the two 504 interview participants to rate their formative assessment experience *prior* to taking EDCI 504 on a scale of 1 to 10 (1 = knowing nothing, 10 = extensive understanding). One participant, who graded herself a zero, had never even heard of the term while, the other teacher had some experience. The second participant, who graded herself a six, said that the course has helped her extensively by introducing her to a new variety of formative assessment tools and teaching her skills in scoring and keeping track of the information gathered by the assessments.

However, both interviewees agreed when I asked them if they see themselves using more formative assessment tools, such as the ones they learned about in 504, to evaluate their students. One of the participants said that formative assessment has already saved her a lot of time. She implemented surveys in her classroom and one of the survey questions pertained to a lab skill that she assumed most of the students would have mastered and remembered. However, she learned that the majority of the class did not have mastery of this skill and many didn't even remember it. Armed with that knowledge, she was able to do a class-wide demonstration and explanation, thus saving

herself a lot of time with independent demonstrations. My other participant commented on how much her fifth, sixth, and seventh graders really liked the one-on-one experience that they got through some of the formative assessment tools she used in the class. Both agreed that formative assessment is a great tool because it gives real time feedback and they were able to adjust their teaching to better suit their students learning needs when necessary.

The qualitative data shows that EDCI 504 has directly impacted MSSE student's teaching methods. One EDCI 509 student wrote, "Yes, now I only assess my students on quizzes and tests (assessments that are graded) after I have conducted a formative assessment." While another wrote, "It gave me more ideas and it definitely made me think about how I actually give my students grades. I find that I do a lot more formative assessment now and give more participation grades because I now feel that I shouldn't be grading students 'as they are learning,' but I should be grading 'what they learned.' I find that I do a lot more formative assessment to see how they are coming along in their learning in order to make sure that they are prepared when I give summative assessment at the end."

There was very little short term change in the majority of the Likert Scaled questions between the 504 Formative Assessment Survey pre and post-treatment. However, the one exception was when I asked all the participants if they felt like they needed more training in formative assessment and would they participate in a workshop or training if it were available, both the 504 pre and post-treatment group said they agreed with the statement, while the 509 participants disagreed.

Numerous participants also mentioned that time and support were two factors that strongly impacted the way and the amount that they used formative assessment in the classroom. One participant wrote, “I would love to use formative assessment more and I do understand the value of regularly using formative assessment in a classroom, but this is my first year teaching three new classes, and I don't feel like I have the time.” While another said. “One challenge in using formative assessments is that, as with most aspects of education, there is very little time available to develop the tools, apply them, and interpret that data, let alone use the data to change instruction.”

INTERPRETATION AND CONCLUSION

The data strongly suggested that teachers that have completed EDCI 504 are utilizing formative assessment tools more frequently as time goes on. Those participants in 509 typically used formative assessment tools 4 times a week, while participants just learning about formative assessment in 504 typically used formative assessment tools 3 times a week. Even though the students in 504 have to implement some formative assessments into their classroom to be successful in the 504 class, they certainly weren't required to implement as many as they did. Furthermore, once they moved on to EDCI 505 and became the 504 post-treatment group, they were no longer required to implement formative assessment into the classroom, yet the number of times they used formative assessment each week in fact modestly rose from 3 to 3.5. The trend of formative assessment becoming more popular in the classroom is important and positive because even though formative assessment can initially be seen as something that interrupts the typical flow of a classroom, it's a necessary change that can help teachers eliminate some

of the trial and error teaching/testing techniques that are sometimes used (Pinchok & Christopher, 2009; Sadler, 1989).

Formative assessment is something that takes a great deal of training before teachers can confidently implement it in their classroom and gather useful data to help influence their teaching (Sawchuk, 2011). Clearly teachers that have gone through the EDCI 504 class have gained the training and confidence to successfully implement assessments such as concept mapping, misconception probes, and minute papers just to name a few. In fact, the majority of the 509 participants felt as if they didn't need any additional training. Often time teachers hit a point where they don't necessarily need any more ideas or training. They just need support and time to fully implement and analyze the ideas and assessments they already know (William, 2008). Additionally, one can assume that most if not all of the participants kept the text from 504, *Classroom Assessment Techniques: A Handbook for College Teachers*, so if they needed any additional ideas or explanations, they could refer to the book.

While 504 was some teacher's first introduction to formative assessment, for others that were already acquainted with the topic, the course provided variety, support, clarification and training in how to score, keep track of and use the data. The 504 class was similar to what a structured teacher learning community could resemble (William, 2008). With all the MSSE classes, the support, communication and ideas from both the teachers and other participants were pivotal in shaping the outcome of the class.

Research shows that the long term success of formative assessment will be intimately connected with a shift in administration attitudes and actions, making sure that both the teachers and students are being measured in a way that allows for and accepts

assessments other than the traditional summative assessments (Black, 2003; Callingham, Pegg, & Wright, 2009). However, both teachers and students will need to change as well. One participant said, “I want to use formative lab skill assessments as a way to teach basic lab skills, then do a summative assessment at the end of that lab period but students don't apply themselves if there is no grade or some points attached, unfortunately.” The reality of formative assessment, just like summative assessment, is that you need a willing audience to participate.

I wasn't surprised by the variety of formative assessment tools being used by the participants. Furthermore, I was not shocked to see which ones were the most popular. Both the minute paper and the muddiest point are assessments that usually require lower levels of time and energy for the preparation, implementation, and analysis (Angelo and Cross, 1993). Since numerous participants mentioned that their biggest challenge was in regards to limited support and time, it makes sense that they would gravitate towards the assessments that are easier to prepare and analyze. Additionally, pre/post surveys can often be easily altered once they have been created and they often produce clean quantifiable data. The infrequently assessment tools in this cohort, such as interviews, misconception probes, open ended questions and tests/quizzes take more time in the either the preparation, execution, data analysis or a combination of these factors.

There was very little short term change in the majority of the Likert scaled questions. This was most likely due to the fact that I administered the initial 504 Formative Assessment Survey after the class had already started. I believe that I would have seen more of a change had the students completed the survey before they started the class and reviewed the literature. After all, once a teacher begins to learn about formative

assessment, it is almost impossible to deny the importance and dramatic impact it can have on their classroom (Herman et al., 2006).

VALUE

Given more time during the project development phase, I would have made significant changes to my data collection tools. First, I would have made more portions of the 509 Formative Assessment survey mirror the 504 Formative Assessment survey. This would have provided me with more Likert scaled data to compare and contrast and see what the long term impacts of EDCI 504 were on teachers classroom practices. Unfortunately, I didn't realize that I could compare 504 and 509 until after I created and administered my 504 Formative Assessment Survey pre-treatment and my 509 Formative Assessment Survey, so at that point I couldn't make any adjustments. Secondly, I would have preferred to give the initial 504 Formative Assessment Survey to the Fall 2011 504 class before the class began.

Due to my time crunch, I had to do the literature review more or less after the project was underway and the assessments had already been developed and administered. If my literature review were done ahead of time, I would have added some additional questions to both the 504 and 509 surveys in regards to what different kinds of support the teachers receive, if any, where that support comes from and if they collaborate or talk with any peers about formative assessment. Additionally, I can see that I should have asked the participants to explain why they used the assessment tools they did and to elaborate on if they would use them again, or if they would try something different next time and why.

Regardless of the constraints, the experience of conducting this research helped me to continually redefine my own thinking and use of formative assessment. It was interesting to see that the most commonly used formative assessment tools by all of the participants were also the ones that I tend to utilize the most. In the past, I have favored misconception probes, pre/post surveys, minute papers and concept mapping. This project made it clear to me that formative assessment isn't a passing fad, and once teachers have the training and confidence, it can quickly become an intricate part of their teaching methodologies.

I really enjoyed the qualitative data that I was able to collect. Since I am not a classroom teacher, I don't have the same experience with the testing and grading that classroom teachers do. However, working in informal science education, I still need to be able to evaluate and change aspects of my programs and lessons that aren't working. There is no doubt that all teachers, classroom or informal, will have road blocks along the way, but regardless of those challenges the research supports the implementation of formative assessment. Having the opportunity to gather information from teachers that are currently using formative assessment and get their honest reaction was fantastic. The knowledge gained from this action research project will be used to inform my own teaching as well as the teacher trainings that I will facilitate in the future. I plan on directly integrating formative assessment tools into the framework of all of the lessons that I teach. Doing something as simple as a thumbs up/thumbs down survey or a misconception probe can be incredibly helpful when you only have students for short periods of time and rarely ever see them more than once, as is often the case in informal education. Furthermore, I would like to build formative assessment tools into the way

that I manage staff. Making sure that all the staff needs are met can be a challenge, so having some assessments in place can help uncover some important untended needs and make for a healthier work environment. Finally, it could be used by the MSU MSSE administration to inform them of the impact that 504 can have on the participants teaching practices.

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APPENDICES

APPENDIX A

INFORMED CONSENT

The purpose of this research project entitled "Assessing Assessment: the Impact of Formative Assessment Training on Teacher Classroom Methods" examines the extent to which the formative assessment training, developed in the MSSE courses, influences teachers' classroom practices over both the short and long term. For this project, students currently enrolled in John Graves' EDCI 504 Evaluation and Measurement in Education class will be asked to complete the 504 Formative Assessment Survey during the fall of 2011 and the again during the Spring of 2012. I will also we asking for five volunteers from the 504 class to participate in a phone interview where I will be asking them questions that are on my 504 Formative Assessment Interview Question form. Additionally, I will be asking students who are currently enrolled in John Graves' EDCI 509 Implementing Action Research in Teaching and Learning class to complete the 509 Formative Assessment Survey.

The first question in the survey is informed consent. You are asked to agree or disagree. If you disagree you will be thanked for you time, but will not be allowed to participate in the survey. If you agree you will be thanked for their time and asked to proceed with the survey.

Identification of all students involved will be kept strictly confidential. Most of the students involved in the research will remain unidentified in any way, and their levels of environmental interaction will be assessed and noted. However, five students will be selected for interviews based on the following criteria: the first five volunteers that contact me from 504. Nowhere in any report or listing will students' last name or any other identifying information be listed.

There are no foreseeable risks or ill effects from participating in this study. All treatment and data collection falls within what is considered normal classroom instructional practice. Furthermore, participation in the study can in no way affect grades for this or any course, nor can it affect academic or personal standing in any fashion whatsoever.

There are several benefits to be expected from participation in this study. This information may be reviewed by the MSSE office and could offer them feedback about the 504 class, especially in terms of both the short and long term impacts of the class. Also you will be aiding in my development as a teacher. I will be gaining valuable experience throughout this project and will use the lessons I learn from this when I teach in the future.

Participation in this study is voluntary, and you are free to withdraw consent and to discontinue participation in this study at any time without prejudice from the investigator. Please feel free to ask any questions of Molly Underwood via e-mail: morussell@gmail.com or molly.russell@ecat.montant.edu or by phone: (802) 999-7410, before signing the Informed Consent form and beginning the study, and at any time during the study.

APPENDIX B

504 FORMATIVE ASSESSMENT SURVEY

1. Formative assessment is something that I currently use in my class _____ times a week. (please circle one)

1 2 3 4 5 6 7 8 9 10+

2. Formative assessment is something that I currently feel confident using in my class.

Very Somewhat Not Very Not at All

3. I would feel comfortable leading a workshop or teacher training for formative assessment.

Very Somewhat Not Very Not at All

4. Formative assessment is something that my administration encourages or requires the use of.

Very Somewhat Not Very Not at All

5. Formative assessment is something that my colleagues currently use.

Very Somewhat Not Very Not at All

6. I feel like I need more training in formative assessment and would participate in a workshop or training if it was available.

Strongly Agree Agree Disagree Strongly Disagree

7. Formative assessment is an important tool for teachers to collect both quantitative and qualitative data.

Strongly Agree Agree Disagree Strongly Disagree

8. Formative assessment can be a fast and effective way to learn about my students strengths and weaknesses.

Strongly Agree Agree Disagree Strongly Disagree

9. My students enjoy participating in my formative assessment evaluations.

Strongly Agree Agree Disagree Strongly Disagree

10. What formative assessment tools for you currently use in your classroom?
(please list all)

11. What formative assessment tools do you plan on using next semester? (please list all)

12. Is there anything else you would like to tell me?

APPENDIX C

504 FORMATIVE ASSESSMENT INTERVIEW QUESTIONS

1. On a scale of 1 to 10 (1 = knowing nothing, 10 = extensive understanding) how well did you understand what formative assessment was before the 504 class began?
2. What did you know about formative assessment before you started 504?
3. What kinds of assessments do you currently use to evaluate your students? (please list as many as you can)
4. Do you see yourself using more formative assessment tools, such as the ones that you learned about in 504, to evaluate your students?
5. Is there anything else you would like to tell me?

APPENDIX D

509 FORMATIVE ASSESSMENT SURVEY

1. When did you take 504?

2. Formative assessment is something that I currently use in my class _____ times a week. (please circle one)

1 2 3 4 5 6 7 8 9 10+

3. I was confident using varying formative assessment tools before taking 504?

Very Somewhat Not Very Not at All

4. I am confident using varying formative assessment tools after taking 504?

Very Somewhat Not Very Not at All

5. I would feel comfortable leading a workshop or teacher training for formative assessment.

Very Somewhat Not Very Not at All

6. I feel like I need more training in formative assessment and would participate in a workshop or training if it was available.

Strongly Agree Agree Disagree Strongly Disagree

7. Formative assessment is something that my administration encourages or requires the use of.

Very Somewhat Not Very Not at All

8. Formative assessment is something that my colleagues currently use.

Very Somewhat Not Very Not at All

9. What formative assessment tools do you currently use in your classroom and why? (please list all)

10. Did taking 504 impact how you assess your students?

11. Is there anything else you would like to tell me?