

Feedback for Teachers: What Evidence Do Teachers Find Most Useful?

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Abstract

The purpose of this exploratory, descriptive study was to investigate teachers' perceptions of three types of feedback on students' performance to guide instructional improvements. These include: (1) formative assessment error analyses, (2) mastery charts of class progress on formative assessments, and (3) summative assessment results comparisons with previously taught classes. Self-report survey data from 92, K-12 teachers involved in a pilot mastery learning program revealed that analyses of students' errors on formative assessments were consistently rated the most useful in planning corrective instruction and in making instructional improvements. Mastery charts and summative assessment results were considered more useful in evaluating the overall effectiveness of mastery learning and in revising implementation procedures. Implications for professional learning and program implementation are discussed.

Keywords

mastery learning, formative assessment, teacher feedback, instructional improvement

Over the past half century in education, few programs have been implemented as broadly or evaluated as thoroughly as those associated with mastery learning. The principles of mastery learning can be found today in classrooms in nations throughout the world and at every level of education. When compared to traditionally taught classes, research shows that students in mastery learning classes consistently reach higher levels of achievement and develop greater confidence in themselves as learners (Anderson, 1994; Guskey & Pigott, 1988; Klecker & Chapman, 2008; Kulik, Kulik, & Bangert-Drowns, 1990a; Miles, 2010).

Developed by Benjamin S. Bloom (1968), a central feature of mastery learning is the use of regular formative assessments to provide students with essential feedback on their learning progress. When this feedback is paired with specific corrective activities designed to help students remedy their learning errors, Bloom believed that nearly all students could reach a high level of achievement and gain the many positive benefits of learning success.

Although extensive research has been conducted on the effectiveness of various forms of feedback to students from formative assessments (see Hattie & Timperley, 2007; Lipnevich & Smith, 2019; McMillan, 2007), few investigations have considered how teachers can best use those same results to guide improvements in their teaching.

The purpose of this study was to investigate teachers' perceptions of three different sources of evidence on students' performance in mastery learning classrooms to guide improvements in their instructional strategies. These sources of evidence include: (1) formative assessment error analyses, (2) mastery charts of class progress on formative

assessments across multiple instructional units, and (3) summative assessment results comparisons with previously taught classes. We sought to determine teachers' judgments of the usefulness of each of these forms of feedback, teachers' perceptions of how helpful each is in guiding improvements in current instructional practices, and the influence of each in sustaining teachers' implementation of mastery learning strategies.

Theoretical Framework

To implement the mastery learning instructional process originally described by Benjamin S. Bloom (1968, 1971a), teachers first organize the concepts and skills they want students to learn into learning units that typically involve about a week or two of instructional time. Following initial instruction on each unit, teachers administer a brief assessment based on the unit's learning goals. Instead of signifying the end of learning in the unit, however, this assessment's purpose is to provide students and teachers with "feedback" on learning progress. To emphasize this purpose, Bloom suggested calling it a *formative assessment*, a term originated by Michael Scriven (1967) to describe different types of program evaluation. Formative assessments identify for students and teachers precisely what was learned well and where improvements are needed (Bloom, Hastings, & Madaus, 1971; Bloom, Madaus, & Hastings, 1981).

Paired with each formative assessment are specific "corrective" activities for students to use to remedy their learning difficulties. Rather than simply repeating the activities from the initial instruction, correctives offer students a new and different approach to learning. Specifically, correctives are designed to present the unit's concepts and skills in a new and different way and engage students in a different manner. Most teachers match these correctives

to each item, group of items, or set of prompts within the assessment so that students need work on only those concepts or skills not yet mastered. In this way, the correctives are “individualized” and “personalized.” They may point out additional sources of information on a particular concept, identify alternative learning resources such as digital learning activities, alternative materials, or web-based instructional materials (DeWeese & Randolph, 2011), or suggest sources of additional practice, such as computer exercises, independent or guided practice, or collaborative group activities.

With the feedback and corrective information gained from the formative assessment, each student has a detailed prescription of what more needs to be done to master the concepts and skills from the unit. This “just-in-time” correction prevents minor learning difficulties from accumulating and becoming major learning problems. It also gives teachers a practical means to vary and differentiate their instruction in order to better meet students’ individual learning needs (Guskey, 1997).

When students complete their corrective work after a class period or two, they take a *second* formative assessment that covers the same concepts and skills as the first but is composed of slightly different problems or questions. This second, “parallel” assessment serves two important purposes. First, it verifies whether the corrective activities were successful in helping students overcome their individual learning difficulties. Second, it offers students a second chance at success and, hence, has powerful motivational value (Changeiywo, Wambugu, & Wachanga, 2011).

To ensure the continued learning progress of students who perform well on the first formative assessment and have no need of

corrective work, Bloom recommended that teachers provide special “enrichment” or “extension” activities to broaden these students’ learning experiences. Enrichment activities are typically self-selected by students and might involve special projects or reports, digital academic games, or any variety of complex but highly engaging problem-solving tasks.

An equally important but often neglected use of formative assessments is the feedback they offer teachers. Formative classroom assessments provide teachers with targeted feedback on the effectiveness of their initial instruction. Students’ responses to items, groups of items, or sets of prompts within the assessments yield valuable information about how well the teachers’ instructional activities and practices helped students achieve specific learning goals. Although this source of teacher feedback is generally recognized, little is known about what types of analyses of formative assessment results are most useful to teachers and to what extent this feedback actually prompts specific changes in teachers’ instructional practices during planned corrective activities or in future instructional tasks.

Methods

Data sources and evidence

The study involved 92 K-12 teachers from a medium size (7,400 students), suburban school district in a Midwest state. The racial composition of the district’s students includes 87% white, 4% African American, 3% Hispanic or Latino, 4% Asian, and 3% mixed race. English is the primary language in 94% of students’ households and only 6% of students’ households have incomes below the poverty level.

All of the teachers included in the study volunteered to take part in a pilot program that involved participating in a one-day professional

learning session on mastery learning instructional strategies. In addition, all participating teachers agreed to implement mastery learning strategies in at least three instructional units during the 2018-19 academic year. Implementing mastery learning involved administering classroom formative assessments after each instructional unit that address the

unit's learning goals, engaging students in specific corrective and enrichment activities, and following with a second, parallel formative assessment for students who did not initially achieve the mastery standard. Tables 1 and 2 describe the grade level and subject area assignments of these 92 teachers.

Table 1

Sample Teachers by Grade Level (n = 92) and Those Who Had Comparable Summative Assessment Data from the Previous Year (n = 75)

Grade Level	Number of Teachers	
	2018	2019
K-2	19	23
3-5	23	27
6-8	15	16
9-12	18	26
Total	75	92

Table 2

Sample Teachers by Subject Area Focus (n = 92)

Subject Area	Number of Teachers
Language Arts	12
Mathematics	53
Science	6
Social Studies	7
Foreign Language	10
Art	2
Business	2
Total	92

Although required to implement mastery learning in only three instructional units, most teachers chose to use the strategies in far more. As Table 3 shows, participating

teachers typically implemented mastery learning strategies in 8 to 10 instructional units, or between 65% and 85% of the units they taught during the academic term.

Table 3

Units Taught Using Mastery Learning and Students Involved Per Teacher by School Level (n = 92)

Grade	Units Taught X (sd)	ML Units X (sd)	% ML Units	No. of Students X (sd)
K-2	13.78 (3.91)	9.04 (3.59)	65.6	21.26 (1.71)
3-5	12.33 (4.83)	10.81 (5.59)	87.7	24.26 (3.61)
6-8	9.75 (4.17)	7.94 (4.74)	81.4	70.13 (41.89)
9-12	12.69 (4.81)	9.73 (5.61)	76.67	84.54 (47.36)

All participating teachers were asked to record three types of evidence on results from their students. The first was a tally of students' errors on each formative assessment. To do this, teachers simply recorded a count of how many students answered each item or prompt

incorrectly on the assessment, making special note of those items or prompts missed by 1/3 or more students in each class. An example is shown in Figure 1. This record was to be used both to direct corrective activities and to plan instructional revisions.

Assessment Analysis (# of Errors / Item)	
1. /	11. ///
2. ///	12. ### ####### //
3. //	13. //
4. //	14. ##
5. ////	15. .
6. /	16. ///
7. ###### #### //	17. #### /
8. ###### #### ####	18. //
9. ///	19. /
10. //	20. //

Figure 1. Example of formative assessment error analysis.

As can be seen from the data displayed in Figure 1, most students did fairly well and answered items 1 through 6 correctly. However, items 7 and 8 were answered incorrectly by large numbers of students in the class, 13 and 15, respectively. Similarly, 17 students answered item 12 incorrectly. Such large numbers of incorrect responses indicate clear trouble spots.

It could be, for example, that these are poorly functioning items. Perhaps they are unclearly stated or ambiguously worded. Maybe they are misleading or mis-keyed. If inspection of the formative assessment indicates such possible item flaws, these need to be corrected by the teacher.

If careful examination of the assessment reveals no problems with the items, however, then clearly the instructional activities the teacher used to help students achieve the learning goals assessed by these items were

ineffective for most students. Such evidence indicates those activities need to be reviewed and either revised or replaced by another, potentially more effective approach or activity.

The second type of evidence on student results that teachers were asked to record was a mastery chart for each class on which the teacher recorded the percent of students in the class who achieved the mastery standard on each of the formative assessments across multiple units. An example is illustrated in Figure 2. Ideally the chart showed the vast majority of students achieving the mastery standard of performance on the second formative assessment in each unit and more students attaining mastery on the first formative assessment as units progressed. This chart reveals the effectiveness of the corrective activities in helping students achieve the mastery standard and shows if students are increasingly prepared to do well in new learning units.

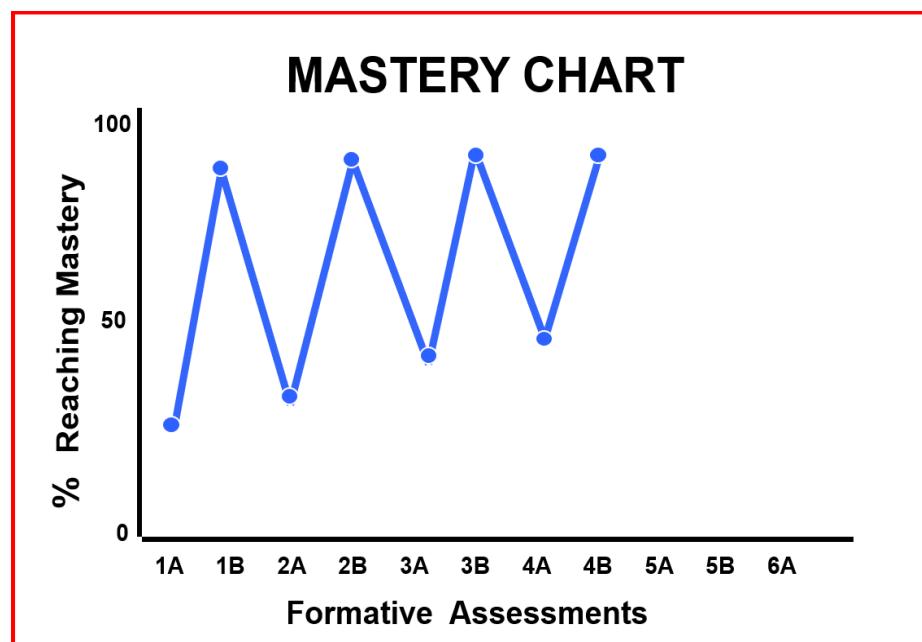


Figure 2. Example of a mastery chart plotting formative assessment results.

For example, not having the majority of students attain the mastery standard on the second formative assessment would be a clear sign of implementation difficulties. It may be the corrective activities planned by the teacher were not effective in helping students remedy their learning problems and alternative strategies need to be planned. Perhaps students did not fully engage in the corrective process, and the teacher needs to provide more direct and structured guidance when students are engaged in corrective work.

Likewise, if an increasing number of students are not attaining the mastery level of performance on the first formative assessment over subsequent units, some change in implementation is needed. Maybe students need additional guidance in preparing for formative assessments. Perhaps they see enrichment activities as simply more work and lack any incentive to do well. Whatever the

case, some change in the teacher's approach to implementing mastery learning needs to be altered.

The third type of evidence on student results that teachers gathered was summative assessment results. After a series of instructional units, teachers administered cumulative, summative assessments to students, primarily for the purpose of determining students' class or course grades. Teachers who had taught in the district for two or more years ($n = 75$) were asked to use the same summative assessment they had used the year before. These teachers then compared the grade distributions of students in this year's mastery learning class with that of students in their previous year's classes. This comparison was used to judge the overall effectiveness of mastery learning strategies. Table 4 shows a summary of these comparisons by grade level group.

Table 4

Average Summative Assessment Grades by School Level (n = 75)

Grade Level	Average Summative Grades		
	2018 G ₁₈ (S ₁₈)*	2019 G ₁₉ (S ₁₉)*	Difference G _{Diff}
K-2	3.60 (0.33)	3.60 (0.28)	0.00
3-5	3.29 (0.49)	3.56 (0.40)	0.27
6-8	2.75 (0.61)	2.89 (0.67)	0.14
9-12	2.53 (0.76)	2.67 (0.78)	0.14
Total	3.08	3.19	0.11

Sample teachers thus had three types of assessment feedback based on students' results to use in evaluating the quality of their instruction and planning instructional revisions. These included (1) formative assessment error analyses, (2) formative assessment success across units, and (3) improvements in summative assessment results.

Instruments

All teachers involved in the pilot program were administered the *Mastery Learning Assessment Results Survey*. The survey, developed by the researchers, consisted of 12 selected-response items and three open-ended response items addressing the three types of feedback. For each feedback type, teachers were asked if the assessment results were surprising or pretty much as expected, how informative the results were in providing insights into the effectiveness of their instruction, and how useful the results were in planning instructional improvements. The open-ended items asked teachers for their suggestions about what adaptations they would recommend and what other types of information would be helpful to them in making improvements in their instruction.

The specific research questions this study sought to answer included:

1. How accurate were teachers' predictions of formative assessment results?
2. How meaningful and useful did teachers find these different types of feedback to be in planning instructional revisions?
3. What types of information (feedback) would teachers find most helpful in making improvements in their instruction?

Responses to the selected-response items in the survey yielded an internal reliability coefficient (α) of .76. All responses were recorded anonymously, and no personal identifiers were included. Proper permissions to conduct the survey research from a university Institutional Review Board were secured.

Results

Descriptive analyses of response patterns to the selected-response items yielded several interesting findings. Content analyses of open-ended items yield further insights into teachers' responses. In addition, descriptive analyses to explore differences in response patterns among teachers at different grade levels and in different subject areas revealed surprising consistency in teachers' responses regarding the usefulness of all three types of feedback information.

The one grade level difference identified in initial descriptive analyses was that elementary teachers were generally more accurate in predicting their students' performance on formative assessments than were middle school and high school level teachers. It is suspected this may be due to differences in teaching context. The elementary teachers in the sample teach mostly in self-contained classrooms where they see fewer students for longer periods of time each day than do middle or high school teachers. This allows elementary teachers to have more extended and more personalized interactions with their students and to observe individual students' performance in learning situations more frequently. These extended interactions are likely to provide elementary teachers with deeper and more detailed information upon which to anticipate their students' performance.

Regarding the different types of feedback, teachers at all levels consistently

rated the tallies of student errors on individual formative assessments as the most meaningful and most useful form of feedback in planning corrective instruction and in making instructional revisions. The detail of the information provided by these item-by-item; formative assessment results provided teachers with highly specific data based on their students' performance. With these data, teachers could determine precisely which concepts and skills had been taught and learned well, and which required a different approach. The mastery charts and summative assessment results looked at student performance on a more general basis. The teachers involved in this investigation considered that information more useful in evaluating the overall effectiveness of mastery learning and making changes in implementation procedures.

When asked about ways to improve the quality and utility of feedback from students' formative assessment results, teachers most frequently noted two factors. First was the provision of more time to develop common formative assessments both to improve the quality of the assessments and to make better use of colleagues' expertise in developing instructional alternatives for the corrective process. Second was stronger leadership, especially from building principals, to ensure greater consistency among teachers in establishing mastery level criteria for the formative assessments. Although teachers at all levels expressed satisfaction with the improvements they saw in their students' performance as a result of implementing mastery learning, many indicated that stronger administrative support and more guidance from school leaders would help them achieve greater consistency in their implementation efforts. Several noted that increased time and opportunity for collaboration with teaching colleagues would also assist in their improvement efforts.

Limitations

Because the sample of teachers involved in this study was drawn from a single school district, results may not be generalizable to districts with different demographics and different student populations. In addition, all of the teachers in the sample volunteered to participate in the mastery learning pilot program, which involved additional work and effort that they were willing to take on. Hence, their responses may not be comparable to teachers who chose not to volunteer. Finally, the data gathered in this study were based on self-reports by participating teachers, which may be subject to various forms of self-reporting bias. These characteristics of the sample and the data gathered limit generalizability of results beyond similar samples of teachers working in similar context.

Conclusions and Scholarly Significance

The focus of feedback in mastery learning instructional strategies, in assessments *for* learning (Stiggins, 2005), and in the use of formative assessments generally, has primarily been directed toward students. Formative assessments help students to identify important learning goals, recognize their progress toward mastering those goals, and correct any learning errors that they may experience. An equally valuable use of such assessment feedback is to help guide teachers in their efforts to improve the quality of their teaching. The results of this research provide preliminary evidence on what types of feedback teachers find most useful and most meaningful in that process.

In addition, the results of this investigation offer direction to efforts designed to make that feedback even more meaningful so that teachers can better judge the quality of their instruction and initiate changes to improve

their effectiveness in helping all students learn well. Although additional research will help clarify the precise nature of the feedback teachers find most valuable and the most

efficient way for teachers to gain that feedback, this study offers an important first step in that process.

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