



FORMATIVE LEARNING IN VIRTUAL ENVIRONMENTS

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INTRODUCTION

As a result of the COVID-19 pandemic and resulting school closures, districts around the nation need online learning solutions to replace face-to-face instruction. During this crisis, many districts wish to prioritize formative learning and assessments over summative strategies. To support districts in this effort, Hanover Research (Hanover) has prepared the following report, which examines best practices for designing instruction that leverages formative assessment to improve student outcomes. This report includes the following sections:

- **Section I** reviews general best practices for integrating formative assessment into instruction, including instructional shifts to support formative learning and strategies to provide students with feedback based on formative assessments.
- **Section II** reviews strategies teachers can use to support formative learning in a virtual environment.

KEY FINDINGS



Students may face challenges engaging productively with formative assessments in an online learning environment. Many students may focus on completing assignments rather than using feedback to support learning or face challenges understanding academic content may find it difficult to understand learning goals. Schools can ensure productive engagement with formative learning in an online environment by:

- Establishing and communicating clear learning targets,
- Establishing and communicating clear criteria for success,
- Building in opportunities for students to self-assess or ask questions based on criteria,
- Providing actionable feedback based on criteria, and
- Giving students opportunities to revise assignments or redo similar assignments after receiving feedback.



Schools may need to modify formative assessments as part of the transition to online learning. Digital learning tools such as quizzes embedded in learning modules and comments on written student work can replace in-person formative assessments. Teachers can use standards such as the National Standards for Quality Online Courses to ensure that formative assessments align with best practices for assessment and formative learning in online environments.



Formative assessment entails a shift in learning from a teacher-centric model in which students are passive recipients of instruction to a more collaborative model in which teachers and students assume joint responsibility for learning. This shift requires teachers to create a classroom culture that holds students accountable for learning by:

- Clarifying learning goals,
- Eliciting evidence of learning,
- Providing feedback, and
- Activating learners



Formative learning begins with teachers using learning progressions to clarify learning goals and evidence. Teachers develop learning progressions by working backward from the target curricular aim to identify the knowledge and skills students must master to reach the curricular aim and the

sequence in which these skills develop. This sequence of learning tasks enables teachers to design formative assessments that systematically measure students' progress towards the curricular aim.



Students learning in online environments may need more feedback than they would in an in-person learning environment due to the transition to a new learning model and a lack of personal connections. Effective feedback provides students with information on their learning goals, how much progress they have made toward reaching learning goals, and how they can move toward learning goals so that students and teachers can adjust learning strategies in response to assessments. Feedback in an online learning environment should:

- Provide a timely response to student questions,
- Offer specific comments aligned to the assignment's objectives,
- Include suggestions for improvement, and
- Personalize feedback for individual students.



Teachers can use student questioning to elicit evidence of learning during instruction and activate learners. Effective student questions provide evidence of student learning and help teachers identify student misconceptions. Whole-class questioning strategies such as student response systems, in which students use remote clickers to respond to whole-class questions, enable teachers to elicit evidence of learning from each student efficiently.



Teachers can use discussion forums to facilitate collaborative learning in online learning environments. Collaborative activities support formative learning by encouraging students to serve as resources for one another's learning and providing evidence to support group learning activities such as class discussions. Collaborative learning may be particularly beneficial in an online learning environment, as opportunities for interaction among students may reduce student discomfort and isolation associated with the transition to online learning.

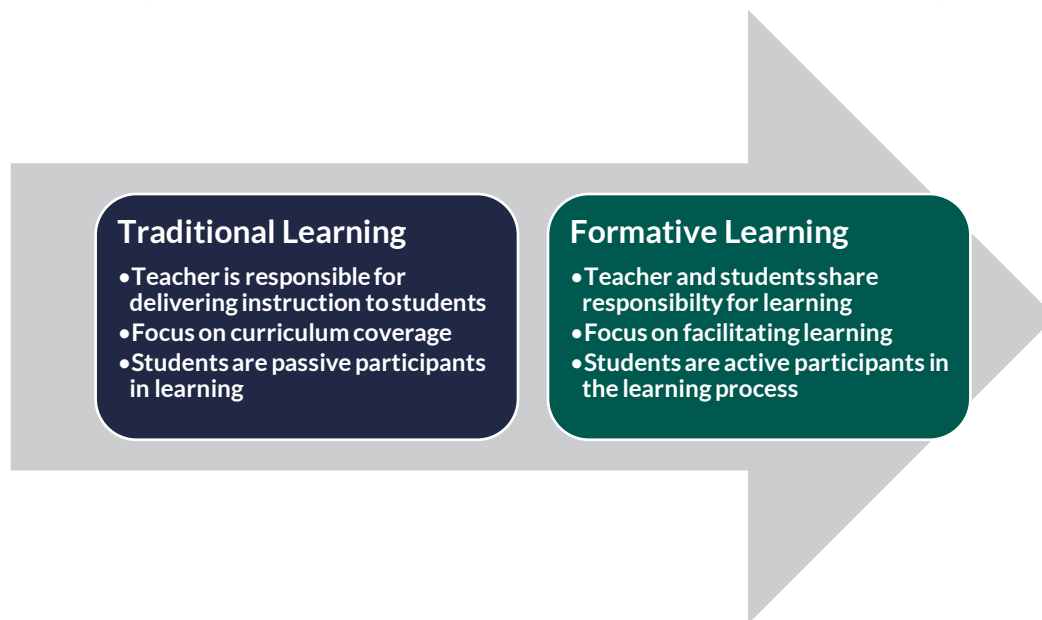
SECTION I: INTEGRATING FORMATIVE ASSESSMENT INTO INSTRUCTION

Formative learning integrates formative assessment into the learning process to drive shifts in instruction that promote student ownership of learning and adaptations to instruction based on assessment data. Teachers must integrate individual formative assessments into an assessment process that aligns assessment with learning goals and the instructional shifts needed to reach them to yield improvements in student achievement.¹ In this section, Hanover Research reviews best practices for integrating formative assessment into instruction. This section begins with a discussion of the instructional shifts needed to align instruction with formative assessments before discussing best practices for using formative assessments to provide high-quality feedback to students.

INSTRUCTIONAL SHIFTS FOR FORMATIVE LEARNING

Formative assessment entails a shift in classroom roles for both students and teachers. As shown in Figure 1.1, as instruction shifts from a traditional to a formative learning model, students assume greater responsibility for actively participating in the learning process, leading to broader shifts in the classroom culture and the role of the teacher.² In a formative learning environment, both students and teachers act as collectors of data to inform learning decisions.³ Both teachers and students use data collected through formative assessment to adjust teaching and learning strategies to close the gap between students' current learning and learning goals or targets.⁴

Figure 1.1: Instructional Shifts from Traditional to Formative Learning



Source: WestEd⁵

¹ Sekulich, K.M. "Learning through Formative Feedback: A Review of the Literature." *Delta Kappa Gamma Bulletin*, 86:3, January 2020. p. 54.

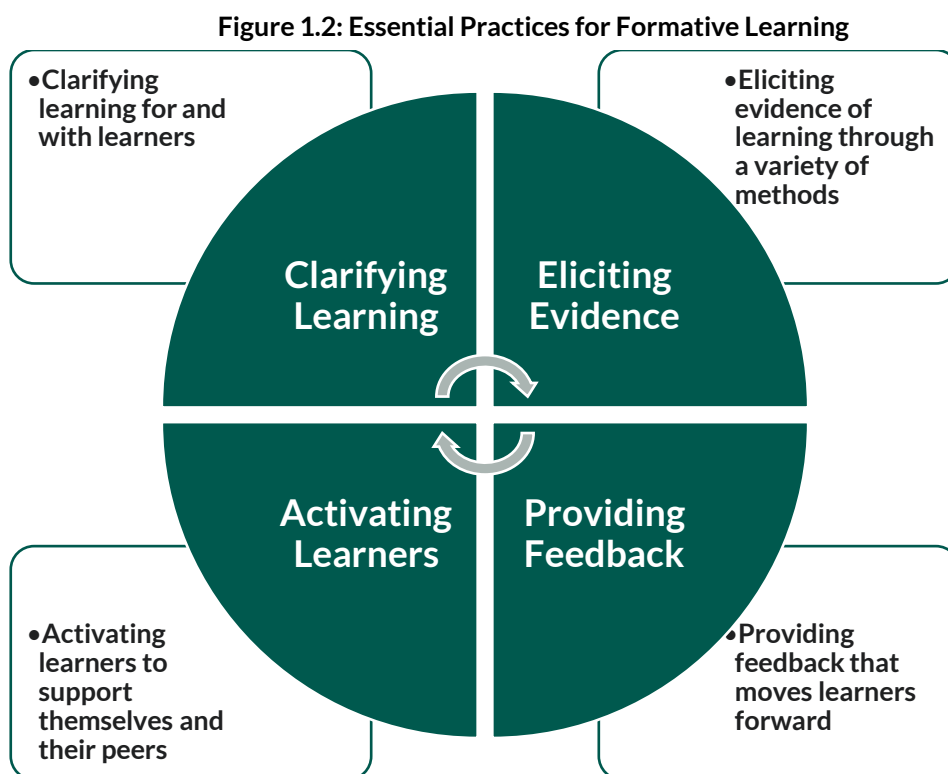
² Gerzon, N. and B. Jones. "Lessons Learned about Leading the Implementation of Formative Assessment: A Framework for School Leaders and Leadership Teams." WestEd, 2020. p. 1. https://eric.ed.gov/?q=formative&ft=on&ff1=dytSince_2016&id=ED606088

³ "3 Reasons Savvy District Leaders Prioritize Formative Assessment." Northwest Evaluation Association, February 2016. p. 2. https://eric.ed.gov/?q=formative&ft=on&ff1=dytSince_2016&pg=5&id=ED567812

⁴ Sekulich, Op. cit., p. 53.

⁵ Chart contents adapted from: Gerzon and Jones, Op. cit., p. 1.

Promoting these shifts requires four key practices, summarized in Figure 1.2. These practices enable teachers to create a classroom culture that supports learning and hold students accountable for their learning.⁶ The Northwest Evaluation Association (NWEA) recommends that teachers improve their support for formative learning by focusing on strategies and tools to support each practice in turn for two weeks at a time. Teachers can also collaborate on strategies to support these essential practices in professional learning communities (PLCs).⁷



Source: Northwest Evaluation Association⁸

STUDENT QUESTIONS

Teachers can use student questioning to elicit evidence of learning during instruction and activate learners.⁹ Teachers should use questions to identify gaps in knowledge and students' current level of understanding. Teachers can reflect on student responses to identify misunderstandings in need of clarification and connect students' current knowledge to new learning.¹⁰ Effective student questions provide evidence of student learning and help teachers identify student misconceptions. Responding to questions also encourages students to engage more deeply with academic content.¹¹

Teachers should ensure that all students have opportunities to respond to questions during class to elicit evidence of learning from and identify learning needs for all students. Whole-class questioning strategies such as student response systems, in which students use remote clickers to respond to whole-class questions,

⁶ "4 Formative Assessment Practices That Make a Difference in Classrooms." Northwest Evaluation Association, March 2016. p. 3. https://eric.ed.gov/?q=formative&ft=on&ff1=dtYSince_2016&pg=5&id=ED567811

⁷ Ibid., p. 9.

⁸ Chart contents taken verbatim from: Ibid., p. 3.

⁹ Ibid., p. 4.

¹⁰ Kim, H. "Teacher Learning Opportunities Provided by Implementing Formative Assessment Lessons: Becoming Responsive to Student Mathematical Thinking." *International Journal of Science & Mathematics Education*, 17:2, February 2019. p. 344.

¹¹ "4 Formative Assessment Practices That Make a Difference in Classrooms," Op. cit., p. 4.

enable teachers to elicit evidence of learning from each student efficiently. Teachers can use student response systems to ask formative assessment questions after each instructional segment, with a total of three to six questions in a 50-minute lesson.¹² Figure 1.3 presents a sample of additional formative assessments that teachers can efficiently administer to a whole class.

Figure 1.3: Sample Whole-Class Formative Assessments

Pre and Post-Assessments

- Teachers can use a pre-assessment to evaluate students' background knowledge before instruction, and a post-assessment to measure learning as a result of instruction

Graphic Organizers

- Teachers can ask students to complete a graphic organizer, such as a Venn diagram, to illustrate what they have learned

Peer Assessment

- Teachers can ask students to evaluate their peers' work using a checklist or rubric and suggest areas for improvement

Exit Commentary

- Teachers can ask students to provide anonymous written comments about their learning at the end of a lesson

Work Sheets

- Teachers can design work sheets that identify the degree to which students have mastered learning objectives

Google Forms

- Teachers can use the Google Forms resource to collect evidence of student learning online

Source: *Knowledge Quest*¹³

Teachers should ensure that students view questions asked during instruction as learning tools, rather than a form of summative assessment. If students believe that these questions will form part of their grades, students may be less willing to respond.¹⁴ It is essential for teachers to communicate to students that formative assessment is a low stakes activity for students to engage productively with formative learning.¹⁵

Teachers can use diagnostic questions, brief multiple-choice questions that identify the reasoning behind incorrect responses, to elicit evidence of learning for all students. Each incorrect answer choice in a diagnostic question identifies a specific misconception. Teachers can then target instruction to address misconceptions revealed through diagnostic questions.¹⁶

Additional Resource

[Diagnosticquestions.com](https://www.diagnosticquestions.com) contains a free database of diagnostic questions in math, science, and computing.

¹² Fuller, J.S. and K.M. Dawson. "Student Response Systems for Formative Assessment: Literature-Based Strategies and Findings from a Middle School Implementation." *Contemporary Educational Technology*, 8:4, 2017. p. 371.

¹³ Chart contents adapted from: Stefl-Mabry, J. "Documenting Evidence of Practice: The Power of Formative Assessment." *Knowledge Quest*, 46:3, 2018. pp. 54–55.

¹⁴ Barton, C. "On Formative Assessment in Math: How Diagnostic Questions Can Help." *American Educator*, 42:2, 2018. pp. 34–35.

¹⁵ Frost, G. and M. Connolly. "Is Fine-Tuning Possible with Grade-Focused Students?" *Collected Essays on Learning and Teaching*, 9, 2016. p. 148.

¹⁶ Barton, Op. cit., p. 37.

LEARNING PROGRESSIONS

Instruction in a formative learning environment begins with teachers clarifying learning expectations and how students will know that they have met expectations.¹⁷ Teachers can structure formative learning using learning progressions, statements that describe students' progress from basic to complex understanding of academic content. Learning progressions help teachers and students analyze formative assessment results and identify what actions are needed for students to move to the next level of understanding.¹⁸

Figure 1.4 presents a sample learning progression for an English language arts unit focused on developing reading comprehension through an understanding of text structure. Teachers develop learning progressions by working backward from the target curricular aim to identify the knowledge and skills students must master to reach the curricular aim and the sequence in which these skills develop. This sequence of learning tasks enables teachers to design formative assessments that systematically measure students' progress towards the curricular aim.¹⁹ Teachers can design formative assessments at each level to monitor students' progress through the learning progression. For example, teachers could assess students' mastery of Level 1 skills by assigning assessments that ask students to group text details into categories. Once students have mastered this skill, they can move on to Level 2 assessments that ask them to infer categories from text details.²⁰

Figure 1.4: Sample Learning Progression

Target Curricular Aim	•Use an understanding of text structure to enhance comprehension of informational text
Level 3	•Summarize text in terms of categories and details
Level 2	•Infer appropriate categories from details
Level 1	•Group details into appropriate categories
Starting Point	•Mastery of critical prerequisite skills

Source: Jobs for the Future²¹

Each formative assessment should align to a single learning goal to elicit evidence of students' progress toward the learning goal and the overall effectiveness of instruction.²² Teachers should divide the learning progression needed to achieve state or district learning standards into learning objectives that specify desired outcomes for each lesson in the three domains listed in Figure 1.5 on the following page.

Figure 1.5: Domains for Learning Objectives

Attitudes	Students' affective relation to the content of the lesson
Skills	What students should be able to do related to the content of the lesson
Knowledge	What students should understand about the content of the lesson

Source: Knowledge Quest²³

¹⁷ "4 Formative Assessment Practices That Make a Difference in Classrooms," Op. cit., p. 4.

¹⁸ Rothman, R. "Measuring Deeper Learning: New Directions in Formative Assessment. Students at the Center: Deeper Learning Research Series." Jobs for the Future, July 2018. p. 6.
https://eric.ed.gov/?q=formative&ft=on&ff1=dtYSince_2016&pg=2&id=ED587373

¹⁹ Popham, W.J. "The Lowdown on Learning Progressions." *Educational Leadership*, 64:7, April 2007.

<http://www.ascd.org/publications/educational-leadership/apr07/vol64/num07/The-Lowdown-on-Learning-Progressions.aspx>

²⁰ Rothman, Op. cit., p. 6.

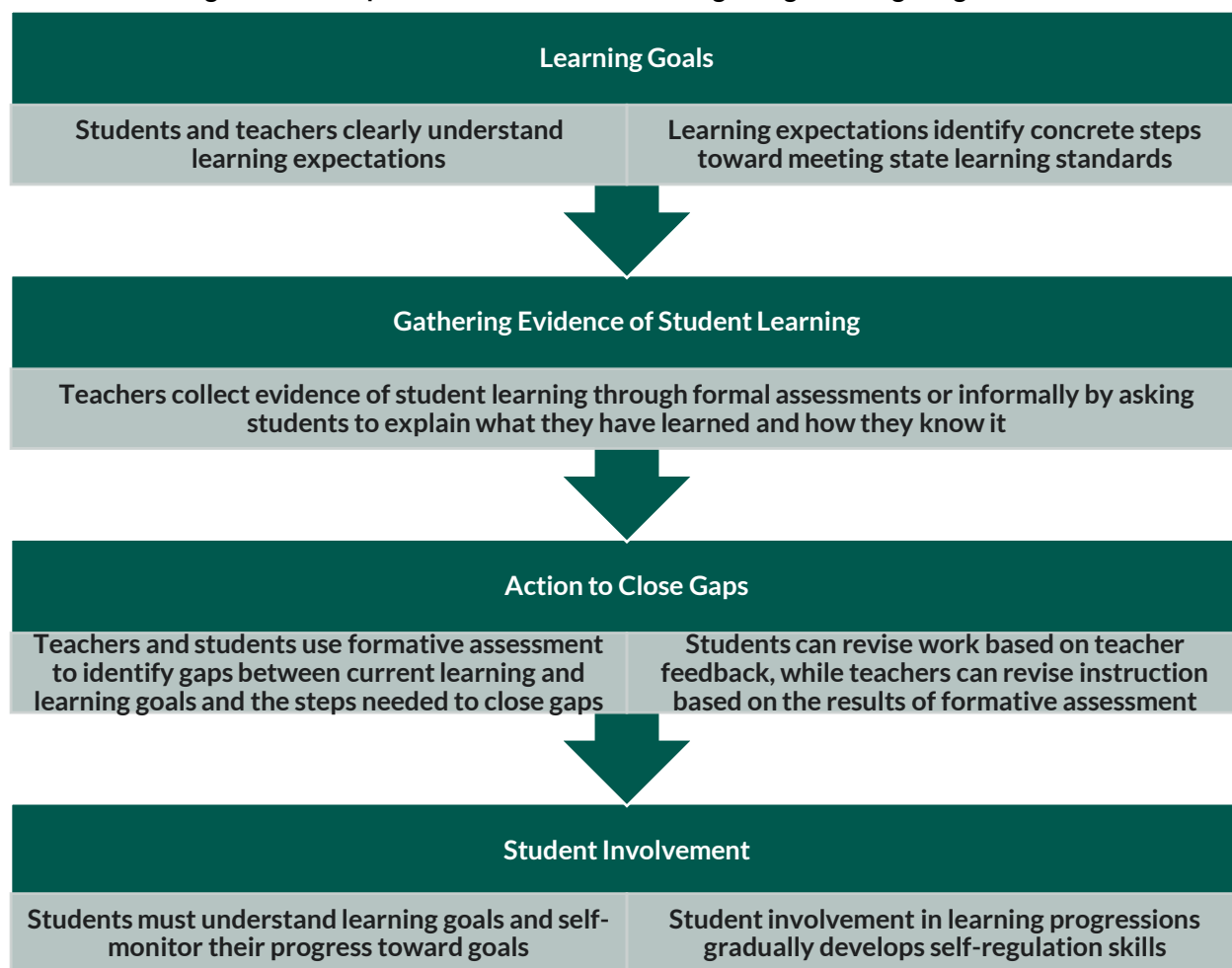
²¹ Chart taken verbatim from: Ibid., p. 8.

²² Stefl-Mabry, Op. cit., p. 52.

²³ Chart contents adapted from: Ibid., p. 53.

Students and teachers incorporate formative assessment into learning progressions using the components of formative learning outlined in Figure 1.6.²⁴ Learning progressions should incorporate frequent informal checks for understanding before, during, and after instruction.²⁵ Checking for understanding enables teachers to understand the cognitive processes students apply to academic content and adapt instruction to support effective learning strategies.²⁶

Figure 1.6: Components of Formative Learning Using Learning Progressions



Source: Jobs for the Future²⁷

COLLABORATIVE LEARNING

Teachers should encourage collaborative learning as part of the shift to a formative learning model. Research on collaborative learning finds that collaboration improves learning outcomes and students' attitudes toward the learning environment, and increases learning transfer.²⁸ Collaborative activities support formative learning by encouraging students to serve as resources for one another's learning and providing evidence to

²⁴ Rothman, Op. cit., p. 6.

²⁵ Riddell, N.B. "Maximizing the Effective Use of Formative Assessments." *Teacher Educators' Journal*, 9, 2016. p. 65.

²⁶ "3 Reasons Savvy District Leaders Prioritize Formative Assessment," Op. cit., p. 4.

²⁷ Chart contents adapted from: Rothman, Op. cit., p. 6.

²⁸ "3 Reasons Savvy District Leaders Prioritize Formative Assessment," Op. cit., p. 6.

support group learning activities such as class discussions.²⁹ Figure 1.7 shows best practices for collaborative learning identified by the International Baccalaureate.

Figure 1.7: Best Practices for Collaborative Learning

Specific and focused teacher role

- Achieved in many cases by targeted professional development related to specific collaborative practices

Purposeful means of grouping students

- Considering variables such as purpose of activity, ability level of students, familiarity of students with one another, social status, and sociocultural backgrounds and norms

Targeted incorporation of technology

- Focused on a specific purpose with defined roles for students, which can be achieved by scaffolding processes inherent in technology itself and/or collaborative scripts

Roles for individual students

- Involves instructing students on how to be a productive member of the group and outlining individual expectations so all students contribute equally to the group's intended outcomes

Task that is open-ended and/or multifaceted

- Task must in some way require students to rely on one another for completion

Specific structuring of the collaborative process

- Achieved by using a specific format, such as jigsaw, a collaborative script, or discourse format, as opposed to simply putting student in groups without consideration of the whats, hows, and whys of collaboration

Consideration of the social complexities of the collaborative process

- Students' sociocultural and academic values, experiences and backgrounds must be taken into account

Sufficient time for cognitive processes involved in collaboration

- Time for student discourse, discussion of readings, and/or creating and sharing representations of thinking

Source: International Baccalaureate³⁰

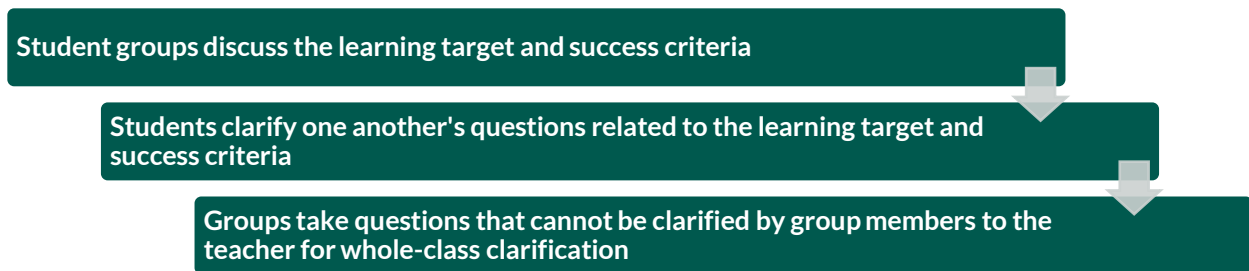
Teachers can support collaboration through group discussions. The NWEA recommends the process outlined in Figure 1.8 on the following page for collaborative discussions to clarify learning targets and success criteria.³¹

²⁹ Barana, A. et al. "Learning Analytics to Improve Formative Assessment Strategies." *Journal of E-Learning & Knowledge Society*, 15:3, September 2019. p. 77.

³⁰ Chart contents taken verbatim from: "Research Summary: Developing and Assessing Students' Collaboration in the IB Programmes." Prepared for the International Baccalaureate by the Education Research Center at Texas A&M University, May 2014. p. 2. <https://www.ibo.org/globalassets/publications/ib-research/studentcollaborationsummary.pdf>

³¹ "4 Formative Assessment Practices That Make a Difference in Classrooms," Op. cit., p. 4.

Figure 1.8: NWEA Process for Group Collaborative Discussions

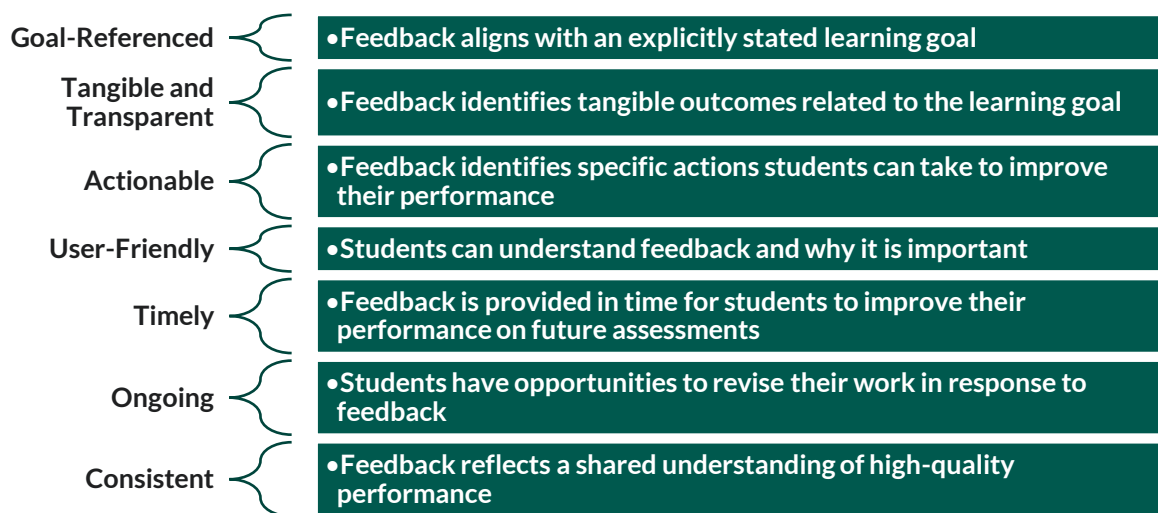


Source: Northwest Evaluation Association³²

PROVIDING HIGH-QUALITY FEEDBACK

Formative assessment improves student achievement by providing both students and teachers with high-quality feedback about student progress.³³ Feedback can provide students with information on their progress toward learning outcomes as well as motivation to move to the next level of learning.³⁴ Research finds that students make significantly greater progress after receiving high-quality feedback than students who receive no feedback or less effective feedback. Adjusting learning strategies in response to feedback also supports the development of students' self-regulation skills.³⁵ Effective feedback enables students to change learning strategies and teachers to change instructional strategies in response to information collected through formative assessment.³⁶ High-quality feedback meets the criteria listed in Figure 1.9. In particular, providing ongoing feedback that allows students to revise work in response to feedback ensures that feedback is usable for students rather than purely summative.³⁷

Figure 1.9: Criteria for Effective Feedback



Source: *Educational Leadership*³⁸

High-quality feedback relies on formative assessments that provide detailed information on students' progress toward learning goals and specific areas for improvement. Assessments that identify at-risk

³² Chart contents adapted from: Ibid.

³³ Rothman, Op. cit., p. 5.

³⁴ Sekulich, Op. cit., p. 55.

³⁵ "3 Reasons Savvy District Leaders Prioritize Formative Assessment," Op. cit., p. 5.

³⁶ Rothman, Op. cit., p. 5.

³⁷ Schwartz, K. "Why Giving Effective Feedback Is Trickier Than It Seems." KQED, April 12, 2017.

<https://www.kqed.org/mindshift/47948/why-giving-effective-feedback-is-trickier-than-it-seems>

³⁸ Chart contents adapted from: Wiggins, G. "Seven Keys to Effective Feedback." *Educational Leadership*, 70:1.

students without providing information on the specific areas where these students need additional support, or assessments that do not provide students with opportunities to revise their work in response to feedback, will not yield improvements in student achievement.³⁹ Formative assessment should provide students with information on their learning goals, how much progress they have made toward reaching learning goals, and how they can move toward learning goals by incorporating the four levels of feedback shown in Figure 1.10.⁴⁰

Figure 1.10: Levels of Effective Feedback

Task Level	Process Level	Self-regulation level	Self Level
•How well tasks are understood and performed	•The main process needed to understand and perform tasks	•Self-monitoring, directing, and regulating of actions	•Personal evaluations and affect (usually positive) about the learner

Source: Visible Learning⁴¹

Teachers can vary the tools used to provide feedback based on individual student needs and the contexts of assignments. Figure 1.11 lists three tools for effective feedback recommended by the NWEA.

Figure 1.11: Feedback Tools Recommended by the NWEA

TOOL	DESCRIPTION
Comment-Only Marking	Provide students with comments, but no grades. This gets them to focus on the learning rather than their rank in the class. Comments are specific to the qualities of the work, designed to promote thinking, and provide clear guidance on what to improve.
ForAllRubrics	This software is free for all teachers and allows you to import, create, and score rubrics on your iPad, tablet, or smartphone. You can print or save the rubrics as a PDF or spreadsheet.
Formative Feedback for Learning	This iPad app is designed to foster and encourage communication between students and teachers by using a conference setting as well as icons to prompt discussions.

Source: Northwest Evaluation Association⁴²

Teachers should also ensure that students engage with feedback productively. To avoid overwhelming students, teachers should provide feedback on one or two key areas of work, rather than every aspect of student performance, and identify areas of strength in addition to areas for improvement. Feedback should target the specific learning goal of an assignment and avoid focusing on areas that are not directly relevant to the learning goal, such as grammar or formatting.⁴³ Students may benefit from activities that specifically focus on the importance of feedback for improvement and strategies for revising work in response to feedback.⁴⁴

PROFESSIONAL DEVELOPMENT TO SUPPORT FORMATIVE LEARNING

Teacher surveys suggest an unmet need for professional development focused on formative learning.⁴⁵ Formative learning can be challenging for teachers to implement due to the complexity of developing

³⁹ Rothman, Op. cit., p. 5.

⁴⁰ Hattie, J. and H. Timperley. "Visible Learning and Feedback." Visible Learning, February 8, 2013. <https://visible-learning.org/2013/02/john-hattie-helen-timperley-visible-learning-and-feedback/>

⁴¹ Chart contents taken verbatim with very minor alterations from: Ibid.

⁴² Chart contents taken verbatim from: "4 Formative Assessment Practices That Make a Difference in Classrooms," Op. cit., p. 6.

⁴³ Schwartz, Op. cit.

⁴⁴ Brody, H.I. and J.M. Santos. "Helping Students Engage with Written Feedback." *Journal of Instructional Research*, 8:2, 2019. pp. 110–111.

⁴⁵ Sekulich, Op. cit., p. 56.

assessments that elicit student thinking and interpreting students' responses.⁴⁶ Professional development should empower teachers to understand the principles of effective formative assessment and use assessment results to inform decisions.⁴⁷ Figure 1.12 presents key professional development needs for formative learning identified in a 2018 review of the secondary literature.

Figure 1.12: Professional Development Needs for Formative Learning



Source: *Delta Kappa Gamma Bulletin*⁴⁸

Research finds that collaborative professional development can support teachers in implementing formative learning. For example, a 2018 study examines an instructional coaching initiative designed to support high school science teachers in implementing learning progressions. This study finds that teachers who participated in professional development were able to align formative assessments with learning progressions, although the degree of alignment was not consistent across teachers. The study also finds a positive impact of professional development on student learning outcomes.⁴⁹

CASE STUDY – MERIDIAN SCHOOL DISTRICT

Meridian School District in Idaho provides an example of a school district that has used professional development to support formative learning. The district partnered with NWEA to implement formative assessment-focused professional development as part of an initiative to ensure that all teachers were capable of eliciting evidence of student learning and using this evidence to make adjustments to instruction.⁵⁰ NWEA provided professional development using the Keeping Learning on Track (KLT) model. The KLT model focuses on the formative learning strategies listed in Figure 1.13.⁵¹ Teachers use these practices to embed formative assessment into everyday instruction and provide feedback to students based on formative assessment results.⁵²

⁴⁶ Furtak, E.M., R. Circi, and S.C. Heredia. "Exploring Alignment among Learning Progressions, Teacher-Designed Formative Assessment Tasks, and Student Growth: Results of a Four-Year Study." *Applied Measurement in Education*, 31:2, April 2018. p. 144.

⁴⁷ Stiggins, R. "Better Assessments Require Better Assessment Literacy." *Educational Leadership*, 75:5, February 2018. pp. 1–2. http://www.thecircleofdata.com/uploads/7/8/8/2/78829528/better_assessments_require_better_assessment_literacy.pdf

⁴⁸ Chart contents taken verbatim from: Sekulich, Op. cit., p. 56.

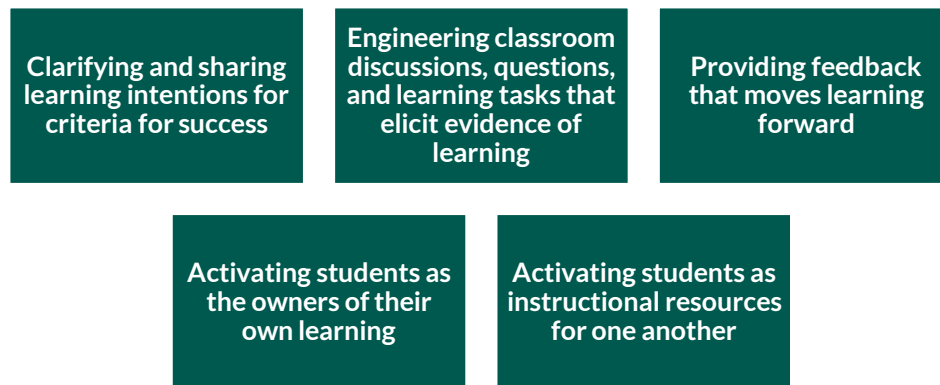
⁴⁹ Furtak, Circi, and Heredia, Op. cit., pp. 145–146, 153.

⁵⁰ "Boosting Engagement and Growth with Formative Assessment: Leaders Share Their Lessons." Northwest Evaluation Association, May 2016. p. 5. https://eric.ed.gov/?q=formative&ft=on&ff1=dytSince_2016&pg=2&id=ED567832

⁵¹ Thum, Y.M. et al. "Keeping Learning on Track: A Case-Study of Formative Assessment Practice and Its Impact on Learning in Meridian School District." Northwest Evaluation Association, 2015. p. 1. https://www.nwea.org/content/uploads/2015/04/Keeping-Learning-on-Track-A-Case-study-of-Formative-Assessment-Practice-and-its-Impact-on-Learning-in-Meridian-School-District_APR_2015.pdf

⁵² Ibid., p. 6.

Figure 1.13: KLT Model Key Strategies



Source: Northwest Evaluation Association⁵³

Meridian School District implemented KLT professional development with support from NWEA over two years. The NWEA believed that this length of time was necessary for the professional development to become sufficiently integrated with teaching and learning processes to drive improvements in outcomes.⁵⁴ KLT professional development consists of two phases, summarized in Figure 1.14. This process reflects research finding that professional learning communities (PLCs) can be effective strategies to support school improvement initiatives.⁵⁵

Figure 1.14: KLT Professional Development Process



Source: Northwest Evaluation Association⁵⁶

To measure the effectiveness of the KLT professional development model, the NWEA commissioned a program evaluation of its implementation in Meridian School District. This evaluation uses surveys and student achievement data to compare outcomes in schools participating in KLT professional development to outcomes for other schools in the district.⁵⁷ This program evaluation finds that implementing professional development using a PLC model significantly increased teachers' use of targeted formative assessment strategies.⁵⁸

⁵³ Chart content taken verbatim from: "Keeping Learning on Track." Northwest Evaluation Association, November 21, 2013. <https://www.nwea.org/content/uploads/2014/07/KLT-one-sheet-Nov13.pdf>

⁵⁴ Thum et al., Op. cit., p. 9.

⁵⁵ Ibid., p. 8.

⁵⁶ Chart contents taken verbatim from: "Keeping Learning on Track," Op. cit.

⁵⁷ Thum et al., Op. cit., pp. 10–18.

⁵⁸ Ibid., pp. 40–41.

Figure 1.15: KLT Professional Development Outcomes

Participating teachers elicited evidence of student learning more frequently than non-participating teachers

Participating teachers provided structured opportunities for student ownership of learning more frequently than non-participating teachers

Participating teachers adjusted instruction in response to student learning needs more frequently than non-participating teachers

Students taught by participating teachers reported higher levels of engagement and understanding of learning goals than students taught by non-participating teachers

Source: Northwest Evaluation Association⁵⁹

⁵⁹ Chart contents taken with minor alterations from: "Boosting Engagement and Growth with Formative Assessment," Op. cit., p. 5.

SECTION II: FORMATIVE LEARNING IN VIRTUAL ENVIRONMENTS

In this section, Hanover reviews best practices for transitioning formative learning to a virtual learning environment. This section begins with a review of formative assessment strategies for online learning environments before discussing strategies to implement the effective formative learning strategies discussed in Section I of this report, including high-quality feedback and collaborative learning, in a virtual environment.

VIRTUAL INSTRUCTIONAL STRATEGIES TO FACILITATE FORMATIVE LEARNING

Below, Hanover discusses strategies to adapt the instructional best practices for formative learning discussed in Section I of this report to an online learning environment. Districts can support teachers in integrating these strategies into online learning by including formative learning strategies into rubrics used to support online course development and implementation. For example, the [NWOi3](#) Evaluation Rubric for Digital Curriculum includes the assessment criteria listed in Figure 2.1. Districts may wish to consider incorporating similar criteria, as well as criteria for formative learning strategies such as collaborative learning and high-quality feedback, into rubrics for online courses.

Figure 2.1: NWOi3 Assessment Standards

- Assessments are aligned with Learning Targets and instruction
- Assessment strategies and student expectations are clearly defined
- A variety of assessment strategies are utilized
- Formative assessments provide students with descriptive feedback and an opportunity to reflect on progress
- Summative assessments evaluate multiple cognitive levels
- Performance assessments have rubrics with detailed, descriptive criteria for evaluation of student work
- Models Next Generation for PARCC assessments

Source: *Athens Journal of Education*⁶⁰

PROVIDING HIGH-QUALITY FEEDBACK

Many teachers report challenges providing high-quality feedback after the shift to online learning. Many online learning environments prevent teachers from providing real-time feedback based on students' responses to in-class questions.⁶¹ However, feedback is essential to maintaining student engagement in virtual learning and communicating evidence of learning to students and families.⁶² Research suggests that feedback provided on student work in a virtual environment can support learning to the same extent as in-person feedback.⁶³

Students learning in online environments may need more feedback than they would in an in-person learning environment due to the transition to a new learning model and a lack of personal connections. In addition to providing feedback on individual assignments, online teachers should reach out to celebrate students'

⁶⁰ Chart contents taken verbatim from: Reinhart, R.V. and S. Banister. "Developing and Implementing Instrumentation for Digital High School Curricula: A Regional Study of a Rubric for Instructional Quality." *Athens Journal of Education*, 5:4, November 2018. p. 373.

⁶¹ Jacobson, L. "For Many Students, Teacher Feedback Is the New Grading System." *Education Dive*, April 30, 2020. <https://www.educationdive.com/news/for-many-students-teacher-feedback-is-the-new-grading-system/576843/>

⁶² Ibid.

⁶³ Ji-Won Son and A. Mahmood. "Does Teacher Feedback on Homework Improve Student Mathematics Achievement Better Than Online Computer Feedback?" *Conference Papers -- Psychology of Mathematics & Education of North America*, November 15, 2018. p. 992.

progress or provide additional support for students who appear to be struggling with online coursework.⁶⁴ The MLVRI recommends that online teachers use the criteria listed in Figure 2.2 to guide student feedback.

Figure 2.2: Criteria for Effective Online Feedback

Responsive	Provide a timely response to student questions
Effective	Offer specific comments aligned to the assignment's objectives
Learning	Include suggestions for how the assignment can be improved
Personal	Make feedback personal and not just a standard response

Source: Michigan's Virtual Learning Research Institute⁶⁵

In addition to providing teacher feedback, teachers can leverage peer feedback to support formative learning in a virtual environment. Peer feedback supports formative learning for both the provider and recipient of feedback and may also support a sense of community in the online learning environment and increase student engagement.⁶⁶

However, students may find peer feedback challenging due to anxiety about giving feedback to peers and limited understanding of quality standards.⁶⁷ Teachers can support students in providing effective peer feedback using structured feedback protocols such as [Kagan Structures](#) or the [RISE Model](#) outlined in Figure 2.3. This model provides students with question stems they can use to provide productive feedback on peer work across four levels of engagement.⁶⁸

⁶⁴ "Teacher Guide to Online Learning." Michigan Virtual Learning Research Institute, Fall 2017. <https://michiganvirtual.org/wp-content/uploads/2017/08/Teachers-Guide.pdf>

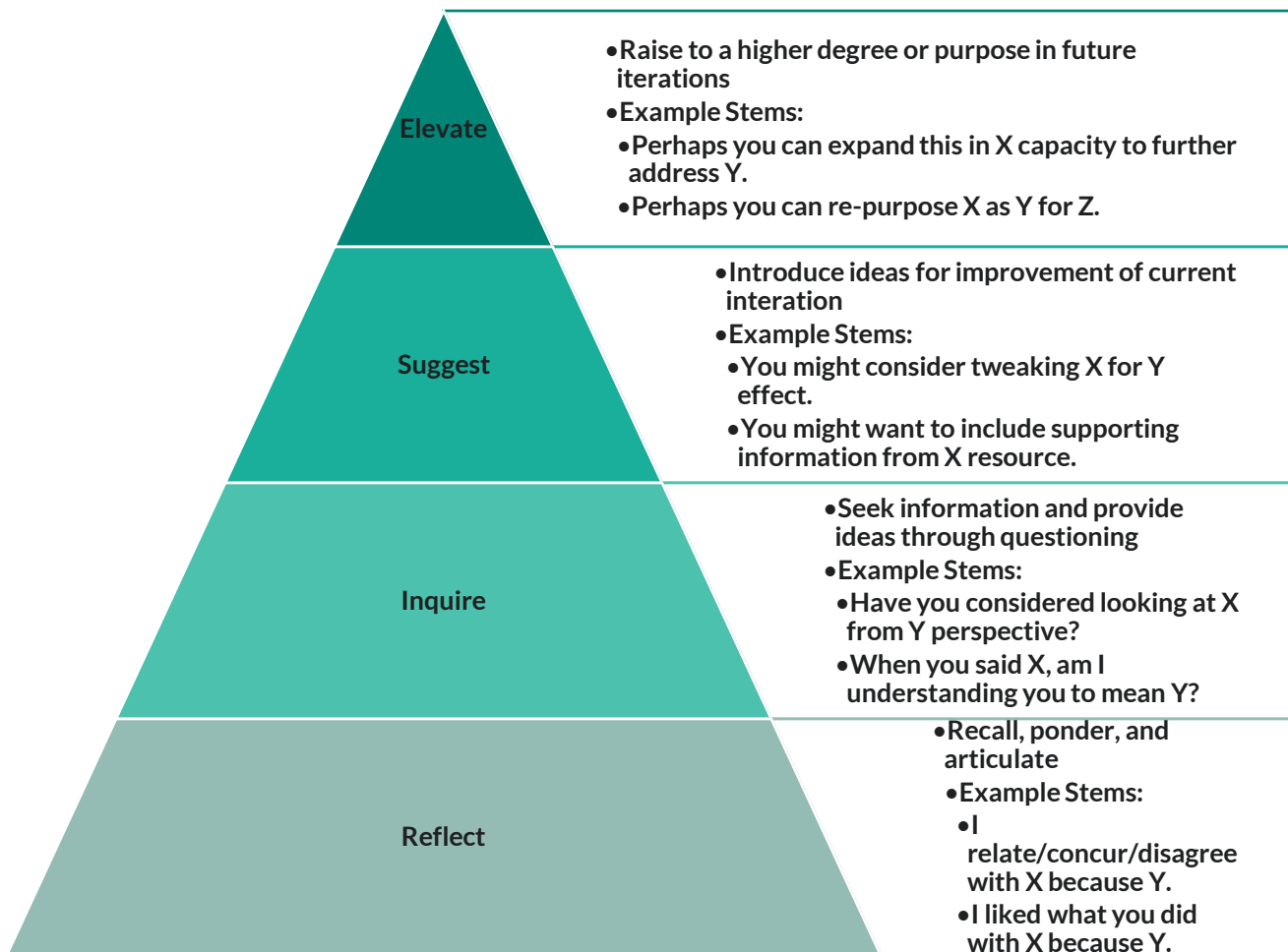
⁶⁵ Chart content taken verbatim with very minor alterations from: Ibid.

⁶⁶ Ertmer, P.A. et al. "Using Peer Feedback to Enhance the Quality of Student Online Postings: An Exploratory Study." *Journal of Computer-Mediated Communication*, 12:2, January 1, 2007.

⁶⁷ Ibid.

⁶⁸ "Setting the Stage for Meaningful Peer-to-Peer Feedback." September 12, 2013. <https://teachonline.asu.edu/2013/09/setting-stage-meaningful-peer-peer-feedback/>

Figure 2.3: RISE Model for Peer Feedback



Source: RISEModel.com⁶⁹

COLLABORATIVE LEARNING ONLINE

Research finds that integrating collaborative activities into online learning improves learning outcomes by facilitating active learning and deeper engagement with academic content.⁷⁰ Online collaboration aligns with formative learning's emphasis on shared responsibility for learning among the teacher and students. In a collaborative online learning environment, the teacher acts as a moderator or facilitator to support students in collaboratively sharing and extending knowledge.⁷¹ Collaboration promotes active learning strategies in a student-centered learning environment where students learn from one another as equals rather than relying exclusively on the teacher to provide instruction.⁷² Collaborative learning may be particularly beneficial in an

⁶⁹ Chart taken verbatim from: Wray, E. "RISE Model for Peer Feedback." RISEModel.com, 2011. <https://static1.squarespace.com/static/502c5d7e24aca01df4766eb3/t/5c4e71ecf950b77130df9756/1548644844456/RISE-Model-Peer-by-Emily-Wray-2018.pdf>

⁷⁰ Kumi-Yeboah, A. "Designing a Cross-Cultural Collaborative Online Learning Framework for Online Instructors." *Online Learning*, 22:4, December 2018. p. 182.

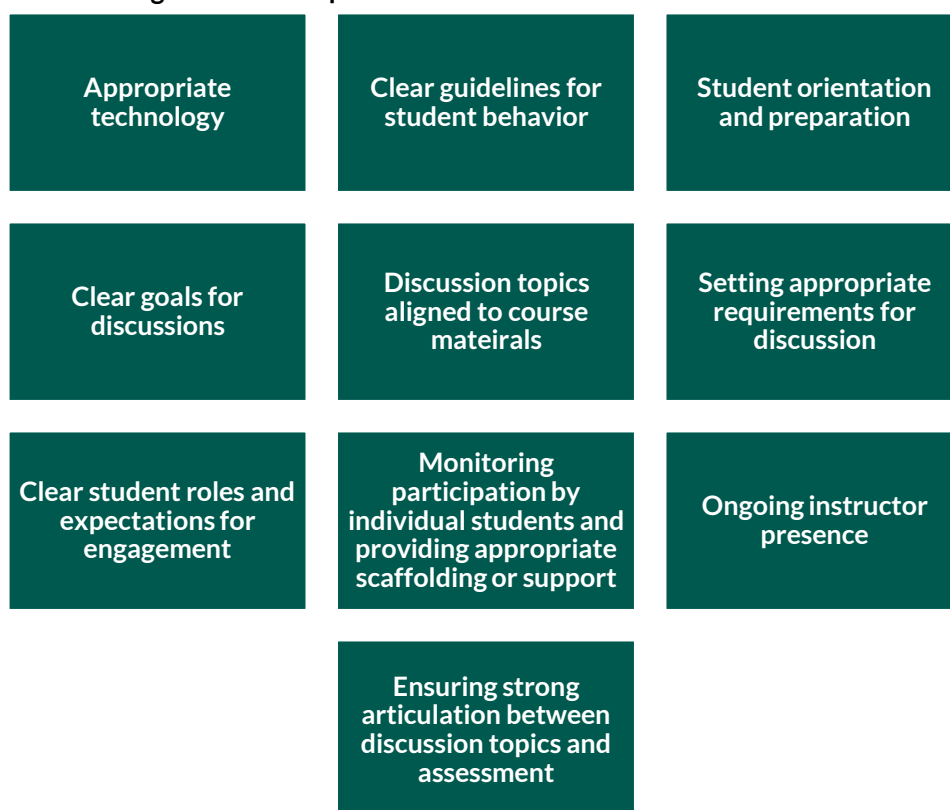
⁷¹ Bates, A.W. (Tony). "Online Collaborative Learning." In *Teaching in a Digital Age*, Tony Bates Associates Ltd, 2015. <https://opentextbc.ca/teachinginadigitalage/chapter/6-5-online-collaborative-learning/>

⁷² Stevens, J. "Finding the Balance: Creating Meaningful Assignments without Overwhelming Instructional Workload." *Journal of Educators Online*, 15:3, December 2018. p. 3. https://eric.ed.gov/?q=formative&ft=on&ff1=dtYSince_2016&pg=6&id=EJ1199177

online learning environment, as opportunities for interaction among students may reduce student discomfort and isolation associated with the transition to online learning.⁷³

Teachers often facilitate virtual collaboration using online discussion forums, in which students post written responses to a topic. Most commonly used learning management systems include functions to support online discussion forums. These forums allow teachers to replicate the collaborative experience of in-class discussions or seminars in a virtual learning format. Because online forums are text-based rather than relying on oral discussions, students can post responses on their own schedules, and teachers can review all responses to formatively assess learning and provide student feedback. Many online discussion forums include a threading capability which allows students to discuss multiple sub-topics.⁷⁴ Figure 2.4 shows principles for effective online discussion forums identified in the secondary literature.

Figure 2.4: Principles for Effective Online Discussion Forums



Source: *Teaching in a Digital Age*⁷⁵

Collaborative learning in a virtual context requires teachers to proactively facilitate collaboration by designing courses that incorporate collaboration and providing feedback to students about collaboration. Teachers ensure that online discussions are productive by organizing discussions and by providing instructional scaffolds to connect discussions to academic content and support student learning goals.⁷⁶ Figure 2.5 summarizes the role of teachers in facilitating collaborative learning activities in virtual learning environments.⁷⁷

⁷³ "Types of Interaction." Indiana University - Teaching Online Course Modules.
https://canvas.ucdavis.edu/courses/34528/pages/types-of-interaction?module_item_id=4974

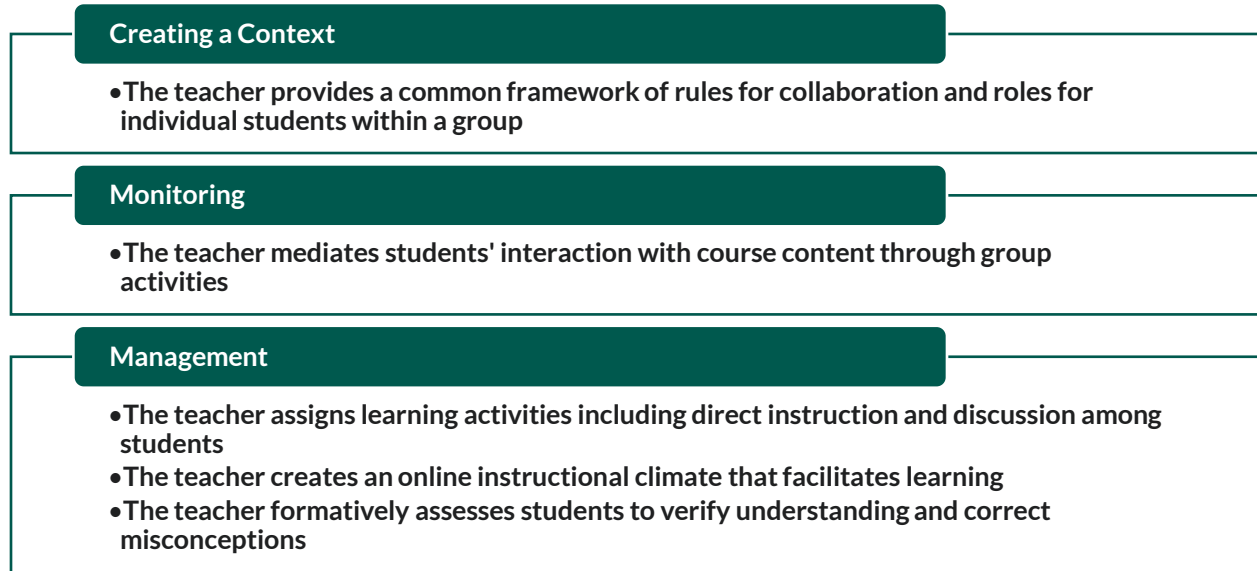
⁷⁴ Bates, Op. cit.

⁷⁵ Chart contents taken verbatim with minor alterations from: Ibid.

⁷⁶ Ibid.

⁷⁷ Margaliot, A. "Step into Online Collaborative Learning: What Teacher Educators Can Learn from the Initial Online Collaborative Experience?" *Ubiquitous Learning: An International Journal*, 11:4, December 2018. pp. 52–53.

Figure 2.5: Teacher Roles in Facilitating Collaborative Online Learning



Source: *Ubiquitous Learning: An International Journal*⁷⁸

IMPLEMENTING FORMATIVE ASSESSMENT IN ONLINE LEARNING ENVIRONMENTS

When transitioning to online learning, schools should review their existing formative assessments for compatibility with remote learning and alignment with changes in grading or summative assessment policies.⁷⁹ Figure 2.6 presents standards for assessment in online learning environments included in the National Standards for Quality Online Courses developed by Quality Matters and the Virtual Learning Leadership Alliance. Notably, several of these standards emphasize the importance of incorporating formative assessments to provide students with information on their progress toward learning objectives and encourage student ownership of learning.⁸⁰

Figure 2.6: Standards for Assessment in Online Learning Environments

STANDARD	EXPLANATION	EXAMPLES
Learner assessments are linked to stated course, unit, or lesson-level objectives or competencies.	▪ A clear link between the assessment and the stated goals of the online course is established.	▪ For an objective or competency where learners are told they need to learn how to identify metaphors in poems, an assessment would present a poem with metaphors and require learners to identify the metaphors therein. The assessment would NOT require the learner to define the term “metaphor,” to write their own metaphor, or to explain the meaning of a metaphor for that objective or competency; although these are helpful tasks, they are not linked to the stated objective or competency.

⁷⁸ Chart contents adapted from: Ibid.

⁷⁹ O’Keefe, L. et al. “Delivering High-Quality Instruction Online in Response to COVID-19: Faculty Playbook.” Online Learning Consortium, Inc, May 18, 2020. p. 33.
https://eric.ed.gov/?q=collaboration+online+learning&ft=on&ff1=dtSince_2016&id=ED605351

⁸⁰ “National Standards for Quality Online Courses.” Quality Matters and the Virtual Learning Leadership Alliance, 2019.
<https://www.nsqol.org/the-standards/quality-online-courses/>

STANDARD	EXPLANATION	EXAMPLES
Valid course assessments measure learner progress toward mastery of content.	Frequent formative assessments measure progress towards mastery of content (as measured by summative assessments). Learners at all learning levels are given the opportunity to demonstrate progress in acquiring major content ideas.	- The online course includes a visible path of formative and summative assessments measuring learner progress toward mastery of content within the course objectives. - Learners are tasked to demonstrate understandings of the immediate major effects of the Great Depression on American politics in the 1930s and 1940s. Multiple formative assessments, such as learning checks, reflections, or short quizzes, are included in the course to measure progress toward mastery as well as a summative assessment to measure mastery. Formative assessments incorporate self-assessments as well as instructor-led assessments.
Assessment practices provide routine and varied opportunities for self-monitoring and reflection of learning.	Assessment strategies provide learners with opportunities to reflect on their progress towards meeting course requirements and mastering learning objectives or competencies.	- Writing assignments that allow for the submission of a draft for instructor comments and suggestions for improvement. - The course includes formative assessments, which provide clear feedback for each answer choice. - Learners engage with interactive games and simulations that have feedback built in. - Self-scoring practice quizzes. - Peer reviews. - Example papers or essays provided for learner viewing.
Assessment materials provide the learner with the flexibility to demonstrate mastery in a variety of ways.	- Multiple methods of assessment strategies are included, based on the specified learning objective or competencies and learner need. - Each assessment does not have to have multiple methods, but over the entire course there are multiple methods of assessments used. - In addition, alternative assessments should be open to all learners when appropriate. Alternative assessment strategies may be more appropriate for some subjects and competency types (e.g., knowledge) than others (e.g., CTE skills). In some cases an authentic assessment strategy may be the only reliable way to measure skill mastery.	- A U.S. History course provides learners with choice and flexibility in demonstrating their application of content knowledge, including oral reports, videos, computer presentations, group posters, musical projects, etc. These may be chosen at the time of assessment or as a second-choice option for revisions, as provided by the instructor. - Learners have an opportunity to correct errors and receive feedback on their level of proficiency. Learners may demonstrate mastery of any content using varying assessment strategies.
Rubrics that clearly define expectations for varied levels of proficiency are created and shared with learners.	- Specific and descriptive criteria are provided for the evaluation of learners' work and assist the instructor in determining the level of achievement of learning objectives and competencies. - Rubrics allow learners and instructors to understand expectations for varied levels of proficiency. Rubrics might be created by instructors as well as course designers, but course designers should create space for rubrics and add templates in accordance with the norms of the school. - Rubrics clearly define expectations by being linked to learning objectives and current state and/or other accepted content standards.	Learners must demonstrate their knowledge of the immediate political outcomes of WWII. The provided rubric allows for a variety of performance-based products, videos, papers, speeches, etc. Further, the provided rubric offers a rich description of key competencies for each type of performance-based product.

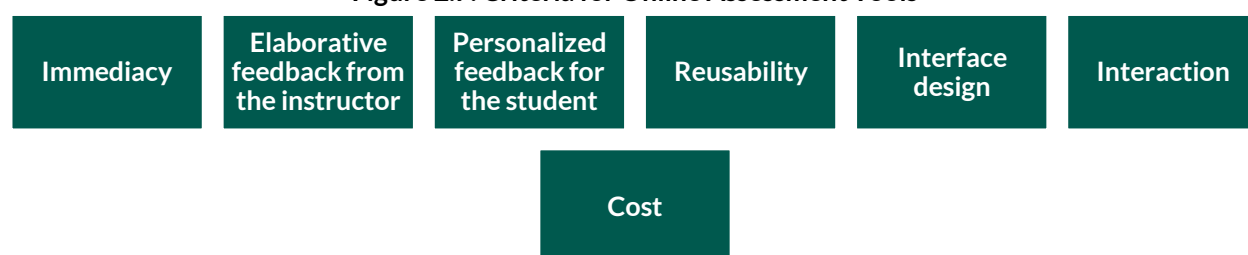
Additional Resource

The NWEA has compiled a list of 75 free or low-cost [digital tools](#) to support formative assessment.

Teachers can use digital learning tools to implement formative assessments in virtual learning environments. For example, online lab simulations may include embedded formative assessments such as prelaboratory activities that encourage students to reflect on their

work and learning error interventions.⁸² Michigan's Virtual Learning Research Institute (MVLRI), an initiative of the Michigan Department of Education to support online learning, recommends assessing online learning through a combination of comments on written student work and quizzes embedded in online learning modules. Teachers can also set up virtual discussion boards where students can post reflections on learning and receive feedback from both teachers and peers.⁸³ When reviewing digital assessment tools, teachers should consider the criteria listed in Figure 2.7 to identify the most effective resources.

Figure 2.7: Criteria for Online Assessment Tools



Source: *Journal of Educators Online*⁸⁴

In addition to transitioning assessments to virtual tools, teachers may need to revise their assessment practices to ensure that students engage productively with online assessments. Many students may approach online learning with a compliance orientation and focus on completing assignments rather than using feedback to support learning. In addition, students who face challenges in understanding academic content may find it difficult to understand learning goals.⁸⁵ Teachers may also face challenges providing students with individualized feedback in an online learning environment.⁸⁶ Figure 2.8 lists strategies recommended by the National Center on Educational Outcomes at the University of Minnesota to support formative assessment in virtual learning environments. These recommendations were initially developed to support students with disabilities but may apply to all students.⁸⁷

⁸¹ Chart contents taken verbatim from: Ibid.

⁸² Chu, M.-W. and J.P. Leighton. "Enhancing Digital Simulated Laboratory Assessments: A Test of Pre-Laboratory Activities with the Learning Error and Formative Feedback Model." *Journal of Science Education & Technology*, 28:3, June 2019. p. 256.

⁸³ "Teacher Guide to Online Learning," Op. cit.

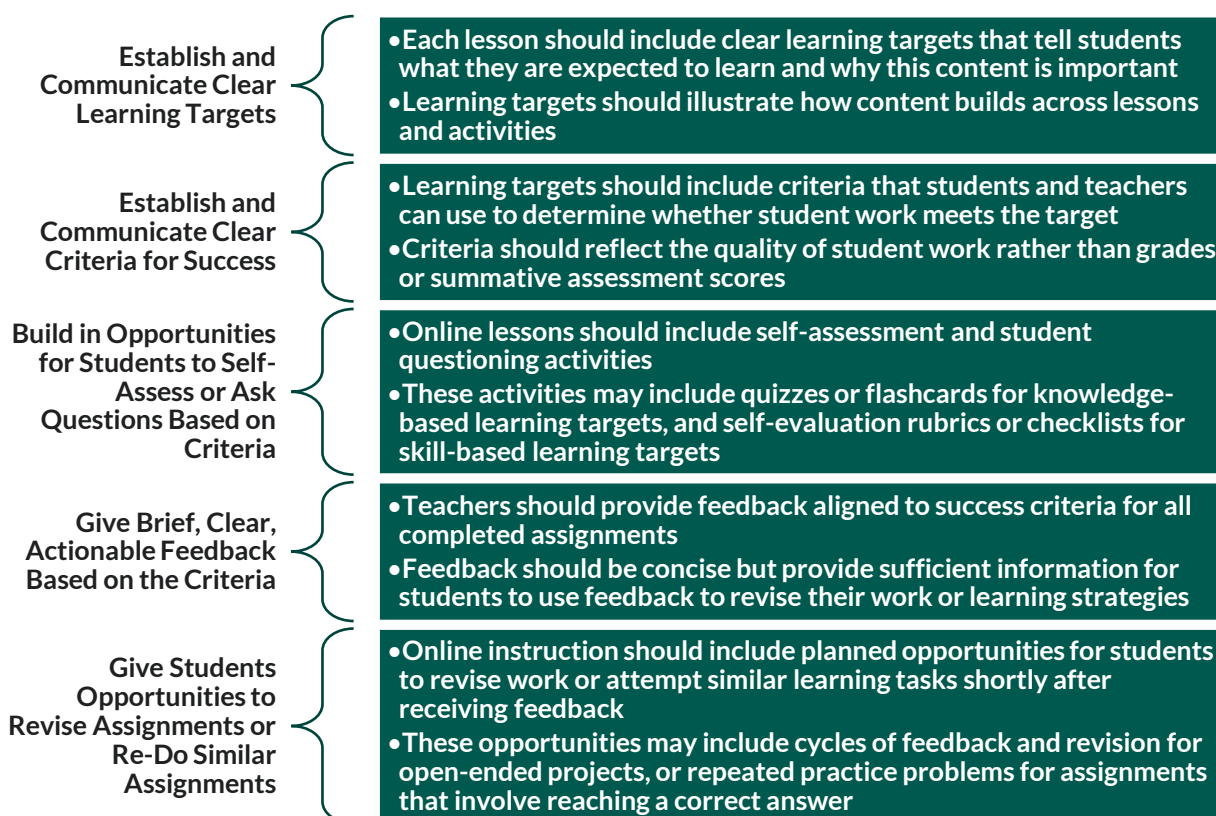
⁸⁴ Chart contents taken verbatim from: Robertson, S.N., S.M. Humphrey, and J.P. Steele. "Using Technology Tools for Formative Assessments." *Journal of Educators Online*, 16:2, July 2019. p. 3.
https://eric.ed.gov/?q=formative&ft=on&ff1=dtSince_2016&pg=3&id=EJ1223780

⁸⁵ Brookhart, S. "Five Formative Assessment Strategies to Improve Distance Learning Outcomes for Students with Disabilities." National Center on Educational Outcomes, May 2020. p. 2.
https://eric.ed.gov/?q=formative&ft=on&ff1=dtSince_2016&pg=2&id=ED605750

⁸⁶ Robertson, Humphrey, and Steele, Op. cit., p. 2.

⁸⁷ Brookhart, Op. cit., pp. 1–2.

Figure 2.8: Recommendations for Formative Assessment in Virtual Learning Environments



Source: National Center on Educational Outcomes⁸⁸

Developing formative assessments in a virtual environment may also impose additional burdens on instructors. Michigan's Virtual Learning Research Institute (MVLRI) estimates that teachers in online learning environments spend around 90 percent of the time developing and communicating feedback to students.⁸⁹ Figure 2.9 presents strategies teachers can use to manage the additional workload required for formative assessments.

Figure 2.9: Strategies to Manage Teacher Workload in Formative Assessments



Source: *Journal of Educators Online*⁹⁰

⁸⁸ Chart contents adapted from: Ibid., pp. 3–7.

⁸⁹ "Teacher Guide to Online Learning," Op. cit.

⁹⁰ Chart contents taken verbatim from: Stevens, Op. cit., p. 1.

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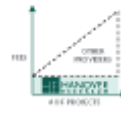
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