Empowering Educators
Supporting Student Progress in the Classroom with Digital Games

PART 1:
A National Survey Examining Teachers’ Digital Game Use and Formative Assessment Practices
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PREFERRED CITATION:
INTRODUCTION

There is growing interest in the use of digital games as part of K-12 teachers’ classroom instruction. For example, in Washington State, legislation is being considered to create a pilot program for integrating games into the school curriculum. And in the fall of 2014, the White House and U.S. Department of Education hosted a game jam to encourage and promote the development of learning games. As with all educational technologies, the most frequently asked question is, “Do they work?” The answer — and the question itself — is complex. Work for what purpose? To help students learn? Learn what? Core content knowledge or 21st century skills? Or is the purpose to engage students? In comparison to what? As with all educational technologies, the real answer to any of these questions is, “It depends.” It depends on lots of factors, including the features of the game and, most importantly, what teachers do with those features as part of their instruction.

The A-GAMES project (Analyzing Games for Assessment in Math, ELA/Social Studies, and Science), a collaboration between the University of Michigan and New York University, studied how teachers actually use digital games in their teaching to support formative assessment. Formative assessment is a set of practices to gauge student progress toward learning goals, and to adjust instruction on the basis of that information to meet students where they are. Formative assessment is arguably one of the most important parts of a teacher’s instructional tool kit. When used well, it has been found to be among the most powerful ways to improve student learning outcomes, and it may be particularly important to the success of low-ability students (Black & Wiliam, 1998). But as with any “best practice,” in order to be effective, formative assessment approaches must be both useful and used. And that’s where games — potentially — come into play.

This study was conducted in two parts: part one, which is detailed in this report, was a nationwide survey of K-12 teachers to investigate common formative assessment
practices, common game use practices, and the intersection of the two. Part two consisted of observations and interviews with 30 middle grades (5-8) teachers in the New York City area who volunteered to use one of eleven games as part of their teaching in Spring, 2014. These games were designed by a variety of learning games developers, and accessed by teachers in our study through BrainPOP’s GameUp portal. The survey offers a “mile high” picture of what teachers are doing with games related to formative assessment. The observations and interviews focused on how teachers used (or did not use) various features within each game that had the potential to be used for formative assessment. Hence, the case studies are organized around these formative assessment features, instead of individual teachers or games. The study is exploratory in nature, and is not intended to compare or gauge the effectiveness of games, game features, or approaches to formative assessment.

The A-GAMES project occupies a special niche among these efforts. Our objective in A-GAMES is to illuminate how teachers understand and make use of game features that support formative assessment. Though prior surveys, including recent work from the Joan Ganz Cooney Center have explored how teachers use games for assessment, the A-GAMES survey is the first that we are aware of designed specifically to examine game use and formative assessment practices in relation to each other. The A-GAMES case studies look across a variety of educational games that are designed to be modest in scope, for use across one or several class periods, related to topics in various content areas. As noted in a 2013 review of the K-12 games market, “Short-form games provide tools for practice and focused concepts. They fit easily into the classroom time period and are especially attractive to schools as part of collections from which individual games can be selected as curricular needs arise” (Richards, Stebbins, & Mollering, 2013, p. 4), whereas longer-form games, such as GlassLab’s SimCityEDU, “have a stronger research base than short-form games and are focused on higher order thinking skills that align more naturally with new common core standards. These games do not fit as easily into the existing school day or classroom time period, but are the source of new experimentation in the research community and a variety of school contexts” (Richards, Stebbins, & Mollering, 2013, p. 4).

We hope the information in this study is useful to game designers as they refine and develop future educational games, to researchers as they frame further studies of games and learning, and also to educators and those who support educators as they think about the role of games in everyday classroom practice.

The field of games and learning is enjoying rapid growth in both research and development. Organizations such as the Joan Ganz Cooney Center and Common Sense Media conduct surveys to explore how teachers use and think about digital video games and related media. The Games for Learning Institute, the Learning Games Network, The Games+Learning+Society Center at the University of Wisconsin, The New Mexico State University Learning Games Lab, GameDesk, and The Education Arcade at MIT conduct research on games and build games that embody their research. Researchers and developers at UCLA/CRESST and GlassLab (in partnership with SRI) are focused particularly on games and assessment.
SUMMARY OF KEY SURVEY FINDINGS

If digital games are to play a key role in classroom instruction, they must support core instructional activities. Formative assessment — a set of techniques used by teachers to monitor, measure, and support student progress and learning during instruction — is a core practice of successful classrooms. The A-GAMES project (Analyzing Games for Assessment in Math, ELA/Social Studies, and Science) studied how teachers actually use digital games in their teaching to support formative assessment.

In Fall 2013, 488 K-12 teachers across the United States were surveyed about their digital game use and formative assessment practices to gain insight into their relationship to one another. The survey explored three areas:

- How teachers use digital games
- How teachers conduct formative assessment
- The relationship between a teacher’s digital game use and formative assessment practices

Our results reveal that the way teachers use digital games for formative assessment is related to their overall formative assessment practices. Using digital games as part of instruction may enable teachers to conduct formative assessment more frequently and more effectively.

TEACHERS’ DIGITAL GAME USE

How often are games being used?
More than half of teachers use games weekly or more often in their teaching and the vast majority are at least moderately comfortable using games as a teaching tool. A teacher’s comfort level with using games for teaching is strongly related to how often they use digital games in their classroom (more comfortable = more often, less comfortable = less often).

What do teachers use digital games for?
The most frequent uses of games are to cover content mandated by state/national or local/district standards. In comparison, fewer teachers use games at least weekly to teach supplemental content.

While 34% of teachers use games at least weekly to conduct formative assessment, only 13% of teachers indicate a similar level of use for games as summative (end-of-unit or end-of-year) assessments.

What are barriers to using games?
The most frequently reported barriers — reported by more than 50% of teachers — are the cost of games, limited time in the curriculum, and lack of technology resources, such as computers and the Internet. Nearly half of teachers report they are unsure of where to find quality games and that it is hard to find games that fit their school’s curriculum. Forty percent of teachers indicate that an emphasis on standardized test scores in their school is a barrier to using games.
TEACHERS’ FORMATIVE ASSESSMENT PRACTICES

When do teachers use formative assessment?
Most teachers report using formative assessment on a regular basis at the end of a lesson. The majority of teachers regularly use formative assessment during a lesson, both spontaneously and at planned checkpoints. Teachers use formative assessment less often at the start of a unit or lesson.

What are they assessing?
When assessing for formative purposes, teachers most often check for facts and knowledge, concepts and big ideas, and mastery of specific skills.

What techniques are they using?
The most frequently used formative assessment technique is observing students in class. At least once during each lesson, the majority of teachers look over students’ shoulders, ask probing questions, and have students solve a problem during class.

How is assessment information used?
Teachers use information from formative assessment on a daily basis to convey/clarify lesson objectives, change the lesson in real-time, and give feedback to students. The overwhelming majority of teachers also use information from formative assessment to modify their instruction weekly or more often.

What are barriers to conducting formative assessment?
Almost one quarter of the teachers say they do not face any barriers to conducting formative assessment. Among those who did indicate barriers, the most frequently selected barriers were related to time. Teachers’ reporting of barriers to formative assessment is consistent across subject areas, grade levels, and years of experience teaching. This suggests that these barriers are widespread.

THE RELATIONSHIP BETWEEN DIGITAL GAME USE AND FORMATIVE ASSESSMENT PRACTICES

Our survey results revealed significant differences in three areas that were related to teachers’ frequency of using digital games for assessment:

1. Game use is related to how teachers conduct formative assessment.
   Teachers who use digital games to make instructional decisions on a daily basis are more than twice as likely to check for motivation and engagement during formative assessment than teachers who rarely use games to make instructional decisions.

2. Game use is related to how teachers use formative assessment information.
   Teachers who use digital games daily to document student progress are much more likely to use information from formative assessment on a daily basis to find or create alternative instructional strategies for a particular topic. Teachers who use digital games for formative assessment more frequently are also more likely to use that information to track student progress and give students feedback on a daily basis. More than half of teachers who use digital games daily for formative assessment track student progress on a daily basis, compared to fewer than 25% of teachers who rarely use games for formative assessment. More than 90% of teachers who use digital games for formative assessment daily give feedback to their students on a daily basis using the information from that formative assessment.
Game use is related to the barriers teachers report to conducting formative assessment. Teachers who use digital games more frequently for formative assessment are more likely to say they do not face any barriers to conducting formative assessment and less likely to say they lack training or preparation for making use of information from formative assessment. Teachers who use digital games weekly or more often to make instructional decisions are also less likely to report that they lack time to administer formative assessment or to name a lack of materials or resources provided by their curriculum for formative assessment as barriers to formative assessment.

Teachers who use digital games in particular ways related to assessment are also less likely to report facing a range of barriers to formative assessment. For example, teachers who use assessment systems built-in to digital games more frequently to assess student learning are less likely to report lack of time as a barrier to formative assessment.
ABOUT THIS SURVEY

In Fall 2013, we released a web-based survey to ask teachers about their use of digital games and their formative assessment practices. We received 488 responses from teachers across the United States.

The teachers who completed our survey were predominantly female (70.6% vs. 29% male), and taught in urban (28.2%), suburban (46.9%), and rural schools (24.9%). 82.7% taught in public schools, 4.5% in charter schools, and 12.8% in private or religious schools. Roughly half of the teachers responding were from schools with 50% or more students receiving free or reduced-price lunch. The teachers who responded had an average of 13.96 years of teaching experience, and the majority (63.9%) had 10 or more years of teaching experience. Fifty-six percent (55.9%) were subject-matter-only teachers, 30.9% were self-contained classroom teachers, who teach some or all subjects, and 13.1% were specialist teachers. Almost half of the teachers taught in grades 6 through 8.

This report shares results from the survey in the following three areas:

» How are teachers using digital games?
» How are teachers conducting formative assessment?
» What is the relationship between teachers’ digital game use and formative assessment practices?

Whenever we report a relationship, it was significant at a value of at least $p<.05$. More detailed information about our survey demographics and methodology is available in the appendix (See page 31).

The Joan Ganz Cooney Center consulted with us on the design of the survey, and allowed us to use some of the same items included in their survey on teachers and digital game use (Takeuchi & Vaala, 2014).
TEACHER RESPONDENTS: BY THE NUMBERS

488 RESPONDENTS FROM ACROSS THE U.S.

70.6% FEMALE
29% MALE

24.9% RURAL
28.2% URBAN

46.9% SUBURBAN

82.7% PUBLIC
12.8% PRIVATE
4.5% CHARTER

13.1% SPECIALIST TEACHERS
30.9% SELF-CONTAINED CLASSROOM TEACHERS
55.9% SUBJECT-MATTER-ONLY TEACHERS

AVERAGE 14 YEARS OF EXPERIENCE
NEARLY HALF TAUGHT GRADES 6-8

Note: In some instances, percentages may not total 100% due to rounding.
HOW ARE TEACHERS USING DIGITAL GAMES?

More than half of the teachers responding to our survey (57%) use games weekly or more often in their teaching, with 18% of teachers reporting that they use games for teaching on a daily basis. Overall, the vast majority of teachers (84%) surveyed are at least moderately comfortable using games as a teaching tool.

Comfort with using games for teaching is strongly related to how often teachers use digital games in their teaching. Almost 80% of teachers who are very comfortable using digital games in their teaching do so weekly or more often, while 100% of teachers who are not comfortable using games do so monthly or less often. But comfort is likely not the only factor keeping teachers from using games in the classroom, as over 50% of teachers who rarely use games in their teaching are at least moderately comfortable using games as a teaching tool.

I use the games primarily to reinforce skills and provide high-engagement practice, particularly when students have been working on the same skill for a long time and are growing restless. I also use digital games as a reward.

—4th grade teacher

Data from all survey respondents (n=450). Note: In some instances, percentages may not total 100% due to rounding.
Digital games are being used for a variety of purposes. Teachers reported using games most often to cover both state/national and local/district standards, with 17% of teachers using digital games daily and 31% using digital games weekly to teach each type of standard. Teachers reported using digital games more frequently to teach mandated or supplemental content than to assess students on either supplemental or curriculum knowledge. Looking specifically at teachers’ use of digital games for formative assessment, 7% of teachers responded that they use digital games daily to conduct formative assessment, 27% weekly, and 35% monthly.

### About how often do you use digital games for each of the following purposes?

Data from respondents who reported using digital games for teaching monthly or more often.

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Rarely/never</th>
</tr>
</thead>
<tbody>
<tr>
<td>To cover content mandated by state/national standards: Common Core State Standards, National Curriculum Standards for Social Studies, Next Generation Science Standards, etc. (n=363)</td>
<td>17%</td>
<td>31%</td>
<td>25%</td>
<td>28%</td>
</tr>
<tr>
<td>To cover content mandated by local/district curriculum standards (n=362)</td>
<td>17%</td>
<td>31%</td>
<td>25%</td>
<td>27%</td>
</tr>
<tr>
<td>To teach supplemental content (not mandated by curriculum standards) (n=359)</td>
<td>11%</td>
<td>25%</td>
<td>38%</td>
<td>26%</td>
</tr>
<tr>
<td>To assess students on supplemental knowledge and/or skills (n=361)</td>
<td>8%</td>
<td>22%</td>
<td>33%</td>
<td>37%</td>
</tr>
<tr>
<td>To conduct formative assessment of students’ standards-based curriculum knowledge and/or skills (n=361)</td>
<td>7%</td>
<td>27%</td>
<td>35%</td>
<td>32%</td>
</tr>
<tr>
<td>To conduct summative (end-of-unit, end-of-year) assessment of students’ standards-based curriculum knowledge and/or skills (n=361)</td>
<td>2%</td>
<td>11%</td>
<td>25%</td>
<td>62%</td>
</tr>
</tbody>
</table>
Over half of the teachers surveyed use digital games monthly or more often to gauge student engagement with material (70%), monitor student time-on-task (55%), prepare students for mandatory district/state tests (53%), make instructional decisions (53%), and understand student mastery of concepts/content at the end of a unit (60%). However, few teachers use games for each of these purposes weekly or daily. On a daily basis, 14% of teachers use digital games to gauge student engagement with material and 11% use them to monitor student time-on-task.

How often do you use digital games for each purpose?

Data from respondents who reported using digital games for teaching monthly or more often.

<table>
<thead>
<tr>
<th>Purpose</th>
<th>About Daily</th>
<th>About Weekly</th>
<th>About Monthly</th>
<th>Rarely/Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>To gauge student engagement with material</td>
<td>27%</td>
<td>29%</td>
<td>30%</td>
<td>14%</td>
</tr>
<tr>
<td>To monitor student time-on-task</td>
<td>21%</td>
<td>23%</td>
<td>29%</td>
<td>11%</td>
</tr>
<tr>
<td>To prepare students for mandatory district/state tests</td>
<td>19%</td>
<td>27%</td>
<td>27%</td>
<td>7%</td>
</tr>
<tr>
<td>To make instructional decisions</td>
<td>18%</td>
<td>28%</td>
<td>28%</td>
<td>7%</td>
</tr>
<tr>
<td>To document students’ overall performance and/or as part of my grading system</td>
<td>14%</td>
<td>28%</td>
<td>28%</td>
<td>7%</td>
</tr>
<tr>
<td>To group students</td>
<td>11%</td>
<td>22%</td>
<td>22%</td>
<td>5%</td>
</tr>
<tr>
<td>To understand student mastery of concepts/content at the END of a unit</td>
<td>20%</td>
<td>36%</td>
<td>36%</td>
<td>4%</td>
</tr>
<tr>
<td>To understand student mastery of concepts/content at the START of a unit</td>
<td>8%</td>
<td>25%</td>
<td>25%</td>
<td>3%</td>
</tr>
</tbody>
</table>
When teachers use digital games to assess student learning, they tend to use features within the game rather than classroom activities to do so. In particular, more than half of teachers who assess student learning with digital games regularly use built-in assessments (29% almost always, 25% sometimes) or students’ game scores to assess knowledge covered outside of the game (26% almost always, 32% sometimes).

A substantial proportion of teachers also create their own assessments and use whole-class discussions to assess what students have learned during game play. Several teachers also assess student learning with games through writing, by asking students to respond to a critical thinking question related to content, or to reflect on challenges and successes during game play.

### When you assess student learning with digital games, how often do you do each of the following?

Data from respondents who reported using digital games for teaching monthly or more often.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Almost Always</th>
<th>Sometimes</th>
<th>Occasionally</th>
<th>Rarely/Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use the built-in assessments or assessment systems that come with certain games</td>
<td>29%</td>
<td>25%</td>
<td>22%</td>
<td>25%</td>
</tr>
<tr>
<td>I look at students’ scores on certain games to assess their knowledge/skills on topics we cover in other formats</td>
<td>26%</td>
<td>32%</td>
<td>21%</td>
<td>21%</td>
</tr>
<tr>
<td>I create my own tests/quizzes to assess what students have learned by playing digital games</td>
<td>19%</td>
<td>25%</td>
<td>19%</td>
<td>38%</td>
</tr>
<tr>
<td>I use whole-class discussions to assess what students have learned through their digital game play</td>
<td>17%</td>
<td>29%</td>
<td>29%</td>
<td>25%</td>
</tr>
</tbody>
</table>
OTHER INTERESTING FINDINGS*:

» A higher percentage of elementary teachers use games weekly or more often for teaching and to cover content mandated by state/national standards: 66% of grade K-2 and 79% of grade 3-5 teachers use digital games weekly or more often for teaching, compared to 47% of grade 6-8 and 40% of grade 9-12 teachers.

Two-thirds of grade 3-5 teachers use digital games weekly or more often to cover content mandated by state/national standards, compared to 52% of grade K-2, 31% of grade 6-8, and 36% of grade 9-12 teachers. This is consistent with the larger market presence of games for younger learners (Richards, Stebbins, & Mollering 2013).

» 42% of self-contained classroom teachers use digital games weekly or more often to carry out formative assessment, compared to 28% of subject-matter-only teachers. They also use built in assessments more frequently.

» A higher percentage of math-only subject matter teachers, compared to ELA/history-only and science-only teachers, use digital games weekly or more often to cover content mandated by state/national standards. About half of math-only subject matter teachers use digital games weekly or more often to cover content mandated by state/national standards, compared to 15% of ELA/history-only and 4% of science-only teachers.

This is also true of overall digital game use and using games to prepare students for mandatory district/state tests. This also is likely due to supply issues regarding the numbers of games that are being produced in different content areas.

» 70% of math-only subject matter teachers sometimes or always use students’ scores to assess students on topics covered outside of the game, compared to 50% of ELA/history-only and 39% of science-only teachers.

The majority of teachers believe games are effective for motivating students (90%), helping students reinforce or master previously taught content (90%), providing useful information about student learning (66%), and teaching students new content (59%).

*Subject matter comparisons – only includes teachers who taught one of: math only, science only, ELA/History only. Self-contained vs. subject matter does not include specialist teachers.
BARRIERS TO USING DIGITAL GAMES IN TEACHING

Teachers in our survey reported a number of different kinds of barriers to using digital games in their teaching. The most frequently reported barriers are the cost of games, limited time in the curriculum, and lack of technology resources, such as computers and the Internet. Other areas of widespread concern are uncertainty about how to integrate games into instruction or where to find games that fit the needs of students or address specific content areas.

Years of teaching experience is only related to the two barriers about finding games. Teachers with more experience are less likely to name difficulty finding games or being unsure of where to find quality games as barriers to digital game use. Experience seems to help. Our data indicates that teachers with fewer years of experience are more likely to select “difficulty finding games that fit the curriculum” as a barrier, compared to teachers with more years of experience. This suggests that over time, teachers may have built up a repertoire of games, or are better able to find games that meet their needs in terms of quality and curricular alignment. However, the other barriers to game use appear to persist even after many years of classroom teaching experience.
What barriers do teachers face in using digital games in the classroom?

Data from all teacher respondents (n=434). Teachers could select more than one option.

- 55% Cost of game software
- 52% Insufficient time in curriculum
- 52% Lack of technology resources (computers, devices, Internet connection)
- 48% Not sure where to find quality games
- 47% Hard to find games that fit our school’s curriculum
- 40% Emphasis on standardized test scores
- 33% Not sure how to integrate games into instruction
- 26% Unfamiliar with technology
- 14% Lack of administrative support
- 9% Lack of parental support
- 10% There are no barriers
HOW ARE TEACHERS CONDUCTING FORMATIVE ASSESSMENT?

In the survey, we provided teachers with the following definition of formative assessment:

By “formative assessment” we mean the various ways that teachers check for student progress or understanding during instruction. The overall goal of formative assessment is to shape instruction or measure progress through instruction. This makes it different from summative assessment, which is used to measure student outcomes, often at the end of a unit.

We are interested in learning more about your formative assessment practices, and the ways you go about formative assessment during your lessons and units of instruction.

When do you use formative assessment?

- **Before a unit/lesson** (n=481)
  - Most/all of the time: 15%
  - Regularly: 27%
  - Sometime: 14%
  - Rarely/never: 45%

- **At planned checkpoints during a unit/lesson** (n=480)
  - Most/all of the time: 23%
  - Regularly: 54%
  - Sometime: 21%
  - Rarely/never: 1%

- **Spontaneously during teaching** (n=482)
  - Most/all of the time: 25%
  - Regularly: 35%
  - Sometime: 32%
  - Rarely/never: 8%

- **At the end of a unit/lesson** (n=482)
  - Most/all of the time: 33%
  - Regularly: 47%
  - Sometime: 16%
  - Rarely/never: 4%

We asked teachers when they conduct formative assessment, the types of knowledge and skills they check for with formative assessment, the techniques they use, and how the information they obtain from formative assessment influences their teaching.

**More teachers reported using formative assessment on a regular basis at the end of a lesson**, with 47% of respondents reporting they do so most or all of the time and an additional 33% reporting that they do so regularly. The majority of teachers regularly use formative assessment during a lesson, both spontaneously and at planned checkpoints. Formative assessment is performed least frequently at the beginning of a lesson; only 15% of teachers use formative assessment before a lesson most or all of the time and an additional 27% do so regularly.
When assessing for formative purposes, teachers most often check for facts and knowledge (68% check at least once during each lesson), concepts and big ideas (64% check at least once during each lesson), and mastery of specific skills (59% check at least once during each lesson). Although prior knowledge and misconceptions can greatly impact students' understanding, only about half of teachers consistently assess them. Only 27% of teachers check for motivation and engagement and 19% check for metacognitive knowledge during each lesson. The majority of the teachers surveyed never assess either metacognitive knowledge or motivation.

<table>
<thead>
<tr>
<th>Knowledge Type</th>
<th>Regularly (throughout each lesson)</th>
<th>Often (at some point during each lesson)</th>
<th>Sometimes (in most lessons)</th>
<th>Occasionally (in some lessons)</th>
<th>Indicated they check, but no frequency given</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facts and knowledge</td>
<td>68%</td>
<td></td>
<td>20%</td>
<td>7%</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Concepts and big ideas</td>
<td>64%</td>
<td></td>
<td>18%</td>
<td>13%</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Mastery of specific skills</td>
<td>59%</td>
<td></td>
<td>16%</td>
<td>6%</td>
<td>19%</td>
<td></td>
</tr>
<tr>
<td>Misconceptions</td>
<td>41%</td>
<td></td>
<td>41%</td>
<td>39%</td>
<td>17%</td>
<td>4%</td>
</tr>
<tr>
<td>Progress and standards</td>
<td>38%</td>
<td></td>
<td>38%</td>
<td>33%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Prior knowledge related to lesson</td>
<td>40%</td>
<td></td>
<td>40%</td>
<td>25%</td>
<td>25%</td>
<td>5%</td>
</tr>
<tr>
<td>Motivation and engagement</td>
<td>63%</td>
<td></td>
<td>63%</td>
<td>27%</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Metacognitive knowledge</td>
<td>65%</td>
<td></td>
<td>65%</td>
<td>19%</td>
<td>13%</td>
<td>3%</td>
</tr>
</tbody>
</table>

How often do you use formative assessment to check for different types of knowledge and skills?
Data from all teacher respondents (n=487).
Teachers reported using a variety of techniques for conducting formative assessment. The most frequently used technique is observing students in class, which 78% of teachers do throughout each lesson. At least once during each lesson, the majority of teachers also look over students’ shoulders (70%), ask probing questions (78%), and have students solve a problem during class (61%). Observing students in class and looking over their shoulders do not require advanced preparation and can take place during regular instruction. Having students write down a short answer or complete an exit ticket, both of which require more class time than other formative assessment techniques, are used least frequently.

**How often do you use each of these formative assessment techniques?**

- **Observe students in class** (n=466)
  - Regularly (throughout each lesson): 93%
  - Often (at some point during each lesson): 6%
  - Sometimes (in most lessons): 1%
  - Occasionally (in some lessons): 0%
  - I don’t typically do this: 0%

- **Probing questions** (n=469)
  - Regularly (throughout each lesson): 78%
  - Often (at some point during each lesson): 15%
  - Sometimes (in most lessons): 6%
  - Occasionally (in some lessons): 0%
  - I don’t typically do this: 0%

- **Looking over students’ shoulders** (n=467)
  - Regularly (throughout each lesson): 70%
  - Often (at some point during each lesson): 18%
  - Sometimes (in most lessons): 8%
  - Occasionally (in some lessons): 4%
  - I don’t typically do this: 4%

- **Solve a problem during class** (n=469)
  - Regularly (throughout each lesson): 61%
  - Often (at some point during each lesson): 20%
  - Sometimes (in most lessons): 15%
  - Occasionally (in some lessons): 4%
  - I don’t typically do this: 0%

- **Show of hands** (n=467)
  - Regularly (throughout each lesson): 33%
  - Often (at some point during each lesson): 20%
  - Sometimes (in most lessons): 37%
  - Occasionally (in some lessons): 10%
  - I don’t typically do this: 4%

- **Write down a short answer** (n=465)
  - Regularly (throughout each lesson): 30%
  - Often (at some point during each lesson): 33%
  - Sometimes (in most lessons): 28%
  - Occasionally (in some lessons): 10%
  - I don’t typically do this: 0%

- **Exit tickets** (n=467)
  - Regularly (throughout each lesson): 19%
  - Often (at some point during each lesson): 23%
  - Sometimes (in most lessons): 24%
  - Occasionally (in some lessons): 34%
  - I don’t typically do this: 4%
### What do you do with the information from formative assessment?

<table>
<thead>
<tr>
<th>Activity</th>
<th>About Daily (%)</th>
<th>About Weekly (%)</th>
<th>About Monthly (%)</th>
<th>I Don’t Typically Do This (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convey/clarify lesson objectives to students (n=435)</td>
<td>20%</td>
<td></td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Change the lesson in real-time (n=431)</td>
<td>27%</td>
<td></td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Give feedback to students (n=434)</td>
<td>43%</td>
<td></td>
<td>16%</td>
<td>9%</td>
</tr>
<tr>
<td>Group students/pair students (n=435)</td>
<td>35%</td>
<td></td>
<td>6%</td>
<td>0%</td>
</tr>
<tr>
<td>Plan or modify future lessons (n=438)</td>
<td>9%</td>
<td></td>
<td>53%</td>
<td>0%</td>
</tr>
<tr>
<td>Track student progress (n=436)</td>
<td>10%</td>
<td></td>
<td>56%</td>
<td>1%</td>
</tr>
<tr>
<td>Find/create alternative instructional strategies for teaching a topic (n=435)</td>
<td>21%</td>
<td></td>
<td>52%</td>
<td>1%</td>
</tr>
<tr>
<td>Continue as planned, but come back to important ideas in the future (n=427)</td>
<td>16%</td>
<td></td>
<td>41%</td>
<td>26%</td>
</tr>
<tr>
<td>Assign additional work (n=427)</td>
<td>25%</td>
<td></td>
<td>40%</td>
<td>25%</td>
</tr>
</tbody>
</table>
In addition to gathering information about student learning, a key component of formative assessment is using this information to modify instruction. Instructional modification takes a variety of forms, including restating objectives for students, giving specific feedback to students, and changing the current lesson or future lessons. The majority of teachers use information from formative assessment on a daily basis to convey/clarify lesson objectives to students (77%), change the lesson in real-time (69%), and give feedback to students (69%). The overwhelming majority of teachers use information from formative assessment to modify their instruction weekly or more often. Among the actions teachers reported taking in response to formative assessment information, the least frequent was assigning additional work to students, however 51% of teachers do this at least weekly.

OTHER INTERESTING FINDINGS:

» Teachers frequently discuss information from formative assessment with teaching colleagues.

» Subject area is related to how teachers conduct formative assessment. Math-only subject teachers more often ask students to solve problems for formative assessment and more often check for procedures and processes and misconceptions. ELA/History-only subject teachers more often check for concepts and big ideas and use probing questions for formative assessment. They are also more likely to use information from formative assessment to create alternative instructional strategies for teaching a topic on a daily basis.

» Of all of the formative assessment techniques, looking over students’ shoulders for formative assessment is the only one that appears to be related to years of teaching experience. Teachers with fewer years of experience are more likely to look over students’ shoulders “often” or “regularly” as a formative assessment practice than more experienced teachers.

» Teaching experience is also related to a teacher using information from formative assessment to give feedback to students. Teachers with fewer years of experience are less likely to use information from formative assessment to give students feedback on a daily basis than teachers with more years of experience.

» 26% of self-contained classroom teachers often or regularly check for metacognitive knowledge, compared to 15% of subject matter teachers.

» The percentage of teachers who ask for a show of hands as a formative assessment technique decreases as grade level increases:

- K-2 teachers (often or regularly): 53%
- Grade 3-5 teachers: 37%
- Grade 6-8 teachers: 32%
- Grade 9-12 teachers: 24%

» Teachers in grades 3-5 and 6-8 use exit tickets more often than other teachers:

- K-2 teachers (often or regularly): 10%
- Grade 3-5 teachers: 25%
- Grade 6-8 teachers: 25%
- Grade 9-12 teachers: 10%

Subject matter comparisons – only includes teachers who taught one of: math only, science only, ELA/History only. Self-contained vs. subject matter does not include specialist teachers. Gradeband comparisons excluded teachers who taught in multiple gradebands.
BARRIERS TO CONDUCTING FORMATIVE ASSESSMENT

We also asked teachers about the barriers they face in conducting formative assessment. Almost one quarter of the teachers we surveyed said they do not face any barriers to conducting formative assessment. Among those who did indicate barriers, the most frequently selected barriers are those related to time, with 59% of teachers selecting at least one of the time barriers.

Barriers to formative assessment were consistently reported across classroom type, grade, and subject area, suggesting that these barriers are widespread. Teachers with more years of teaching experience are less likely to view insufficient training or preparation for doing formative assessment as a barrier to formative assessment and are more likely to select that they do not face any barriers to conducting formative assessment. Surprisingly, teaching experience is not significantly related to any of the other barriers, suggesting that barriers to formative assessment do not go away with experience.
What barriers do you face in conducting formative assessment?
Data from all teacher respondents (n=447). Teachers were able to select more than one response.

- There is not enough time to use the formative assessment results to modify instruction. 44%
- There is not enough time to administer formative assessments. 40%
- Curriculum doesn’t provide materials/resources for formative assessment. 32%
- Formative assessment results conflict with other information/data (e.g., summative test results). 18%
- Insufficient training/preparation for making use of formative assessment results. 18%
- Curriculum materials are too inflexible. 15%
- Insufficient training/preparation for doing formative assessment. 14%
- Formative assessments don’t give me the information I need for instructional modifications. 6%
- I don’t know what to do with the information I get from formative assessments. 5%
- It’s too hard to make sense of the information I get from formative assessments. 3%
- Other barriers not listed here. 13%
- I do not face any barriers in conducting formative assessment in my classroom. 24%
WHAT IS THE RELATIONSHIP BETWEEN TEACHERS’ DIGITAL GAME USE AND FORMATIVE ASSESSMENT PRACTICES?

Our main objective in this work was to examine the relationship between teachers’ game use and formative assessment practices. The survey results revealed significant differences in three areas that were related to teachers’ frequency of using digital games for assessment:

1. How teachers conduct formative assessment
2. How teachers use formative assessment information
3. The barriers they report in conducting formative assessment

Teachers who use digital games to make instructional decisions more frequently are also more likely to check for motivation and engagement, and less likely to check for facts and knowledge when conducting formative assessment.

A teacher who uses digital games to make instructional decisions on a daily basis is more than twice as likely to check for motivation and engagement during formative assessment than a teacher who rarely uses games to make instructional decisions.

Teachers’ formative assessment practices by their frequency using digital games to make instructional decisions.

Data from respondents who reported using digital games for teaching monthly or more often [Rarely (n=167), Monthly (n=97), Weekly (n=64), Daily (n=23)].

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Facts and Knowledge</th>
<th>Motivation and Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>60.9%</td>
<td>46.9%</td>
</tr>
<tr>
<td>Weekly</td>
<td>46.9%</td>
<td>43.3%</td>
</tr>
<tr>
<td>Monthly</td>
<td>43.3%</td>
<td>29.9%</td>
</tr>
<tr>
<td>Rarely</td>
<td>29.9%</td>
<td>22.2%</td>
</tr>
</tbody>
</table>

How often teachers use games to make instructional decisions
Teachers’ formative assessment practices by their frequency using digital games for formative assessment.

Data from respondents who reported using digital games for teaching monthly or more often [Track student progress: Rarely (n=111), Monthly (n=119), Weekly (n=91), Daily (n=24); Give feedback to students: Rarely (n=111), Monthly (n=117), Weekly (n=91), Daily (n=24)].

Teachers who more frequently use digital games for formative assessment are more likely to use information from formative assessment to track student progress and give students feedback on a daily basis. Slightly more than 54% of teachers who use digital games daily for formative assessment use information from formative assessment to track student progress daily, compared to only 24.3% of teachers who rarely use games for formative assessment. Similarly, 91.7% of teachers who use digital games for formative assessment daily give feedback to students on a daily basis using information from formative assessment.

For example, while 17.5% of teachers who rarely or never use games for formative assessment say they do not face any barriers to conducting formative assessment, 48% of teachers who use games daily for formative assessment report that they do not face any barriers to conducting formative assessment. Teachers who use digital games weekly or more often to make instructional decisions are more likely to say they do not face any barriers to formative assessment. They are also less likely to report facing several particular barriers to formative assessment. For example, 44.3% of teachers who use digital game to make instructional decisions monthly or less often report that they face the barrier of lack of time to administer formative assessment, compared to 22.1% of teachers who use digital games to make instructional decisions weekly or more often.

Our survey results suggest a relationship between using digital games and a reduction of barriers to conducting formative assessment. Teachers who use digital games for formative assessment more frequently are more likely to say they do not face any barriers in conducting formative assessment and less likely to say they lack training or preparation for making use of information from formative assessment.
Barriers teachers face in conducting formative assessment by their frequency of using digital games for formative assessment.

Data from respondents who reported using digital games for teaching monthly or more often [Rarely (n=114), Monthly (n=123), Weekly (n=95), Daily (n=25)].

Percent of teachers who report no barriers to conducting formative assessment

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Rarely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent</td>
<td>48.0%</td>
<td>24.2%</td>
<td>26.0%</td>
<td>17.5%</td>
</tr>
</tbody>
</table>

Percent of teachers who report the barrier of insufficient training or preparation for making use of information from formative assessment

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Rarely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent</td>
<td>4.0%</td>
<td>15.8%</td>
<td>12.2%</td>
<td>26.3%</td>
</tr>
</tbody>
</table>

Barriers teachers face in conducting formative assessment by their frequency of using digital games to make instructional decisions.

Data from respondents who reported using digital games for teaching monthly or more often [Monthly or more often (n=262), Weekly or more often (n=86)].

Percent of teachers who report the barrier the curriculum doesn’t provide materials/resource for formative assessment

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Weekly or more often</th>
<th>Monthly or less often</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent</td>
<td>22.1%</td>
<td>34.7%</td>
</tr>
</tbody>
</table>

Percent of teachers who report the barrier of lack of time to administer formative assessment

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Weekly or more often</th>
<th>Monthly or less often</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent</td>
<td>22.1%</td>
<td>44.3%</td>
</tr>
</tbody>
</table>

Percent of teachers who report the barrier of insufficient training/preparation for doing formative assessment

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Weekly or more often</th>
<th>Monthly or less often</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent</td>
<td>5.8%</td>
<td>15.6%</td>
</tr>
</tbody>
</table>

Percent of teachers who report no barriers to conducting formative assessment

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Weekly or more often</th>
<th>Monthly or less often</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent</td>
<td>34.9%</td>
<td>21.0%</td>
</tr>
</tbody>
</table>
OTHER INTERESTING FINDINGS:

Teachers’ particular formative assessment practices with digital games appear to be related to their overall formative assessment practices, suggesting that rather than changing how teachers assess students, games might enable teachers to conduct formative assessment more frequently and more effectively.

For example, teachers who use student scores more frequently to assess student learning with digital games are also more likely to check for procedures and processes during formative assessment and more likely to have students solve a problem as formative assessment during each lesson. In contrast, teachers who more frequently create their own assessments to assess student learning with digital games are more likely to check for metacognitive knowledge during formative assessment.

Finally, teachers who more frequently use whole-class discussions to assess student learning with digital games are more likely to use probing questions to conduct formative assessment. In several cases, teachers’ digital game assessment practices were also related to how they use information from formative assessment.

Those who use digital games daily to document student progress are much more likely to use information from formative assessment on a daily basis to find or create alternative instructional strategies for a particular topic. Teachers who use digital games in particular ways related to assessment were also less likely to report facing a range of barriers to formative assessment.

For example, teachers who use built in assessment systems more frequently to assess student learning with digital games are less likely to report that lack of time for conducting formative assessment is a barrier to formative assessment.
TEACHER PROFILES

Trying to understand the implications of our survey data across many different issues and many different types of teachers is a complex endeavor. We therefore used cluster analysis to better identify how various teacher practices around games and formative assessment are related. The clusters were built based on teachers’ reported game use practices and their perceived effectiveness. We were able to identify four distinct “teacher profiles” from this data. These four types of teachers differ in terms of how often they use digital games for different purposes, and how effective they believe games are for different purposes.

There were no significant differences in cluster membership by classroom type, subject area, gender, years of teaching experience, age, or grade band.

TEACHER #1
The enthusiastic game-using teacher.

GAME-USE FREQUENCY AND PURPOSE
Teachers in this cluster use games more often than teachers in other clusters for understanding student learning and making instructional decisions, and use games more frequently than the average teacher in our study for all of the purposes identified in our survey.

PERCEPTION OF GAMES
These teachers are the most likely to believe games are effective for a variety of purposes.

FORMATIVE ASSESSMENT PRACTICES
These teachers are the most likely to use formative assessment before a lesson on a regular basis, and also the most likely (together with teachers in cluster 2) to check for motivation and engagement during formative assessment. Teachers in this cluster are almost twice as likely as teachers in cluster 4 to say they do not face any barriers to formative assessment.

77 (18%) of the teachers who responded to our survey fell into this cluster.
TEACHER #2
The frequent (but not for core content) game-using teacher.

GAME-USE FREQUENCY AND PURPOSE
Teachers in this cluster use games more frequently than teachers in other clusters for supplemental content and gauging student engagement. They are less likely to use games for assessment or to cover mandatory content than the average teacher in our study.

PERCEPTION OF GAMES
These teachers believe games are effective for a variety of purposes, but slightly less so than teachers in cluster 1.

FORMATIVE ASSESSMENT PRACTICES
These teachers are most likely to check for motivation and engagement during formative assessment and most likely to use information from formative assessment to give students feedback on a daily basis.

72 (17%) of the teachers who responded to our survey fell into this cluster.

TEACHER #3
The frequent, but not so enthusiastic game user.

GAME-USE FREQUENCY AND PURPOSE
Teachers in this cluster use games more frequently than teachers in other clusters to cover mandatory content. However, they use games less often than the average teacher in our study for assessing students and for supplemental content.

PERCEPTION OF GAMES
These teachers do think that games are more effective than the average teacher in our study, but not to the extent of teachers in clusters 1 or 2.

FORMATIVE ASSESSMENT PRACTICES
Teachers in this cluster are less likely to check for motivation and engagement during formative assessment and less likely to report that they do not face any barriers to formative assessment than teachers in clusters 1 and 2.

136 (32%) of the teachers who responded to our survey fell into this cluster.
TEACHER #4
The not-so-into games teacher.

GAME-USE FREQUENCY AND PURPOSE
Teachers in this cluster use games less often, on average, than teachers in the other three clusters, for any of the purposes we asked about. They are less than half as likely to use digital games on a weekly basis than teachers in other groups, and at least three times less likely to be very comfortable using digital games than teachers in other groups.

PERCEPTION OF GAMES
These teachers are least likely to think games are effective for any purpose, especially for teaching new content to students or providing useful information about student learning.

FORMATIVE ASSESSMENT PRACTICES
These teachers are less likely than teachers in any of the other clusters to check for motivation and engagement during formative assessment, or to use information from formative assessment to give feedback to students on a daily basis. They are also least likely to report that they do not face any barriers to formative assessment.

136 (32%) of the teachers who responded to our survey fell into this cluster.
Teachers’ game use and barriers by teacher profile cluster group.

Data from all teacher respondents [Games for teaching/ Very comfortable using games: Cluster 1 (n=77), Cluster 2 (n=72), Cluster 3 (n=136), Cluster 4 (n=136); Barriers: Cluster 1 (n=75), Cluster 2 (n=69), Cluster 3 (n=132), Cluster 4 (n=135)].

<table>
<thead>
<tr>
<th>Use games for teaching weekly or more often</th>
<th>Are very comfortable using games for teaching</th>
<th>Report difficulty finding games that fit the curriculum as a barrier to using digital games</th>
<th>Report being unsure where to find quality games as a barrier to using digital games</th>
</tr>
</thead>
<tbody>
<tr>
<td>74.0%</td>
<td>76.6%</td>
<td>38.7%</td>
<td>37.3%</td>
</tr>
<tr>
<td>0%</td>
<td>73.6%</td>
<td>33.3%</td>
<td>43.5%</td>
</tr>
<tr>
<td>67.6%</td>
<td>60.3%</td>
<td>43.2%</td>
<td>41.7%</td>
</tr>
<tr>
<td>32.4%</td>
<td>19.9%</td>
<td>61.5%</td>
<td>58.5%</td>
</tr>
</tbody>
</table>

Teachers’ formative assessment practices and barriers by teacher profile cluster group.

Data from all teacher respondents [Motivation and engagement: Cluster 1 (n=77), Cluster 2 (n=72), Cluster 3 (n=135), Cluster 4 (n=136); Feedback to students: Cluster 1 (n=73), Cluster 2 (n=67), Cluster 3 (n=132), Cluster 4 (n=131); Do not face any barriers: Cluster 1 (n=77), Cluster 2 (n=72), Cluster 3 (n=134), Cluster 4 (n=134)].

<table>
<thead>
<tr>
<th>Check for motivation and engagement during formative assessment</th>
<th>Use information from formative assessment to give feedback to students daily</th>
<th>Report no barriers to conducting formative assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>49.4%</td>
<td>75.3%</td>
<td>36.4%</td>
</tr>
<tr>
<td>54.2%</td>
<td>83.6%</td>
<td>29.2%</td>
</tr>
<tr>
<td>29.6%</td>
<td>67.4%</td>
<td>20.9%</td>
</tr>
<tr>
<td>28.7%</td>
<td>60.3%</td>
<td>19.4%</td>
</tr>
</tbody>
</table>
APPENDIX

METHODS AND DEMOGRAPHICS

In Fall 2013, we fielded a 20-minute web-based survey with items about formative assessment practice, video game practice, and teacher/school demographics. Teachers were recruited to complete the survey through postings on social media and on popular education and technology web sites. The survey yielded 488 valid responses from teachers in the United States. We compared our population of teachers to the national population of teachers using data from the NCES Schools and Staffing Survey (SASS). Our respondents were compared based on gender, age, years of teaching experience, school type, and the percent of students who receive free or reduced price lunch. Gender was the only category in which our respondents were significantly different (at the p<0.05 level) from the national population of K-12 teachers. While nationally, 23.9% of teachers are male, 29% of our survey respondents were male. Given these demographic similarities, we feel our population of teachers is similar to teachers nationwide along demographic dimensions. However, it is important to keep in mind that our teacher respondents may not be representative along other dimensions. For example, given our recruitment methods, it is possible that the proportion of teachers in our survey who use games may exceed the game using proportion of the national population of teachers.

The survey response population included teachers from urban schools (28.2%), suburban schools (46.9%), and rural schools (24.9%). Nearly 83% were in public schools, 4.5% in charter schools, and 12.8% in private or religious schools. Nearly 46% of the teachers responding were from schools with 50% of more students receiving free or reduced price lunch. Our respondents had taught for an average of 13.96 years, and the majority (63.8%) have 10 or more years of teaching experience. Nearly 56% of our respondents are subject matter only teachers, 30.9% are self contained classroom teachers, who teach some or all subjects, and 13.1% are specialist teachers. Almost half of our teachers teach at least one of grades 6 though 8.
What grades do you teach?
Data from all teacher respondents (n=487). Note: Respondents were asked to select all grades they teach.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>K–2</td>
<td>14.2%</td>
<td></td>
</tr>
<tr>
<td>3–5</td>
<td>34.9%</td>
<td></td>
</tr>
<tr>
<td>6–8</td>
<td>49.3%</td>
<td></td>
</tr>
<tr>
<td>9–12</td>
<td>24.4%</td>
<td></td>
</tr>
</tbody>
</table>

What subjects do you teach?
Data from all subject-area teachers (n=272). Note: Respondents were asked to select all subjects they teach.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math</td>
<td>48.2%</td>
<td></td>
</tr>
<tr>
<td>Science</td>
<td>23.9%</td>
<td></td>
</tr>
<tr>
<td>History/SS</td>
<td>18.4%</td>
<td></td>
</tr>
<tr>
<td>ELA</td>
<td>14.7%</td>
<td></td>
</tr>
<tr>
<td>Comp/Tech</td>
<td>8.8%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>20.2%</td>
<td></td>
</tr>
</tbody>
</table>

What type of school do you teach in and where is it located?
Data from all teacher respondents (n=484).

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban (n=136)</td>
<td>98</td>
<td>72%</td>
</tr>
<tr>
<td>Suburban (n=227)</td>
<td>187</td>
<td>82%</td>
</tr>
<tr>
<td>Rural (n=122)</td>
<td>98</td>
<td>80%</td>
</tr>
</tbody>
</table>

- Public
- Private/Religious
- Charter
RESEARCH TEAM

Barry Fishman, Ph.D. is Professor of Learning Technologies in the University of Michigan School of Information and School of Education. His research focuses on: teacher learning and the role of technology in supporting teacher learning, video games as models for learning environments, and the development of usable, scalable, and sustainable learning innovations through design-based implementation research (DBIR). He was co-author of the Obama Administration’s 2010 U.S. National Educational Technology Plan, served as Associate Editor of The Journal of the Learning Sciences from 2005-2012, and was the 2001 recipient of the Jan Hawkins Award for Early Career Contributions to Humanistic Research and Scholarship in Learning Technologies. He received his A.B. from Brown University in English and American Literature in 1989, his M.S. from Indiana University in Instructional Systems Technology in 1992, and his Ph.D. in Learning Sciences from Northwestern University in 1996.

Jan L. Plass, Ph.D. is the Paulette Goddard Professor of Digital Media and Learning Sciences at NYU Steinhardt and founding director of CREATE. Dr. Plass is also the co-director of the Games for Learning Institute. His research is at the intersection of cognitive science, learning sciences, and design, and seeks to enhance the design of highly interactive visual environments. His current focus is on cognitive and emotional aspects of information design and interaction design of simulations and educational games for math and science education. Dr. Plass received his MA in Mathematics and Physics Education and his Ph.D. in Educational Technologies from Erfurt University (PH Erfurt, Germany).

Michelle Riconscente, Ph.D. is Director of Learning and Assessment at GlassLab. Dr. Riconscente brings expertise in evidence-centered assessment design, formative assessment, psychometrics, cognitive science, and instruction to the Lab’s innovations in creating game environments and support materials that strongly link learning and assessment. Previously an Assistant Professor of Educational Psychology and Technology at the University of Southern California, she authored the first controlled study of an iPad learning app, and her published research on student motivation includes mixed-methods investigations of U.S. and Mexican students’ subject-matter interest. Dr. Riconscente has served as a consultant to several organizations, including Harvard University, MIT, GameDesk, Scholastic Inc., The Carnegie Corporation of New York, UCLA’s CRESST, Motion Math Games, and the U.S. Department of Education. She holds a bachelor’s degree in mathematics-physics from Brown University and a Ph.D. in educational psychology from the University of Maryland, College Park.

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ENDNOTES

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