Leveraging Real-Time Data to Accelerate Student Achievement and Strengthen Teacher Practice

By

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A Case Study on the Instructional Uses and Impact of ExitTicket at Leadership Public Schools
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Average students in the four Leadership Public Schools Bay Area high schools enter 9th grade with elementary-level skills. The goal is to bring them to high school readiness by 10th grade and college readiness by graduation. Faced with this daunting acceleration challenge, LPS hired Dr. Scot Refsland, a technology entrepreneur, as Chief Innovation Officer; formed a teacher design team to build off of the pioneering work of classroom teacher Taylor Garland; and in 2011, began building a real-time data app called ExitTicket (www.exitticket.org). The results: regular student achievement gains of 2.5+ grade levels (on NWEA’s MAP assessment).

Introduction to ExitTicket: A Powerful Tool to Accelerate Student Achievement

ExitTicket has gotten strong results because it provides rich data and feedback in the moment of assessment. This public and private data empowers students to take ownership over their learning and gives teachers the ability to intervene in the moment of misunderstanding.

1-on-1 Intervention: Using an iPad “heatmap” (left), teachers receive real-time formative data on how each student answers each question, allowing immediate, over-the-shoulder intervention in the moment of misunderstanding.

Whole-Class Motivation and Reteaching: An engaging analysis of the data is facilitated by the Projector Mode (right). By projecting questions and results with plenty of whiteboard space, teachers help students with misunderstandings and facilitate error analysis: “What error might have caused someone to choose this answer?” or “How could you change the question to make this the right answer?” (VIDEO: Reteaching)

Small Group Intervention: With the iPad’s “Reteach” page (below), teachers can see a list of students with the same wrong answer enabling them to pull small groups for targeted reteaching. (VIDEO: Small Group)

Increased Engagement and Student Ownership: ExitTicket engages students with private, immediate feedback on their work. Students earn smiley faces when they get questions right, and productive feedback when they get questions wrong. Students are also engaged by a sense of belonging as they contribute to public, class-wide mastery goals. These many “micro-successes” help them build a growth mindset, and encourage them to seek out targeted support. As they track their progress against standards in their own personal dashboard, students learn to set their own goals and take responsibility for their growth.
Strengthening Teacher Practice Through The Powerful Use of Formative Assessment

While ExitTicket is known for moving student achievement, its hidden impact is advancing teacher practice. ExitTicket has been specifically designed to open up possibilities for teachers to move from basic to advanced instructional uses of formative assessment in technology-enhanced classrooms. (see Rubric-style explanation). However, it should be noted that all strategies remain useful at all times; teachers may select from the whole range of real-time formative assessment strategies within a given day or unit, depending on the outcomes desired.

Basic Instructional Uses
The first major goal in the use of ExitTicket, and formative assessment in general, is to maximize end-of-class content mastery in traditional instructional settings. In order to achieve this goal the teacher must have a repertoire of basic full-class instructional and classroom management strategies. Teachers must also be proficient at defining objectives and developing unit and daily lesson plans. The basic formative assessment uses include:

- **Checking for Understanding** Launches, exit tickets, homework checks, flipped classroom quizzes, practice sessions, mock tests
- **Real-Time Intervention** “Over-the-shoulder” 1-on-1 interventions, whole-class error analysis

Advanced Instructional Uses
As teachers notice individual student needs emerging in the data, the goal often shifts to maximizing the acceleration of each individual student’s mastery. For this to be successful they need a repertoire of strategies for whole-class, small/flexible group and individualized instruction. This use of formative assessments demands a depth of content knowledge that allows the development explicitly linked learning targets from the course to unit to daily level. And finally, the teacher must have established a classroom culture of productive partner talk and small group accountability. Strategies at this level include:

- **Student Agency/Ownership**: Student investment in personal data tracking, self-reflection and peer-support protocols, explicit growth mindset framing, errors as opportunities for learning
- **Critical Questioning**: Polls to catalyze discussion, high-level partner talk, critical thinking questions and ones that facilitate error analysis, free-response questions for rubric grading
- **Differentiation**: Diagnostic assessments, small groups and leveled groups, differentiated assignments/learning activities, stations and rotations

Personalization
Teachers who have become skilled at basic and advanced uses of formative assessment sometimes begin using formative assessment to create more personalized, student-centered learning opportunities. This demands a deep content knowledge, readily available range of instructional strategies to call upon as needed and a classroom climate of student independence, agency and ownership. The primary strategy at this level is:

- **Blended Learning**: A mix of online and in-person instruction, playlists with links to content and practice, student self-tracking, and assessments “when you’re ready”
ExitTicket Levels of Use Rubric: Gaining Instructional Power From Real-Time Formative Assessment

The rubric below displays the basic and advanced levels at which teachers leverage ExitTicket in the classroom. Links in the text move the reader directly to a more detailed description of the use of strategies. Videos embedded in the rubric provide classroom exemplars of ExitTicket formative instructional practices in use. Teachers who are skilled in the use of formative assessments leverage basic and advanced instructional strategies as well as more fully personalized approaches as appropriate to particular learning objectives. They use a variety of technology and non-technology based formative assessment strategies including, but not limited to, ExitTicket.

<table>
<thead>
<tr>
<th>BASIC INSTRUCTIONAL USES</th>
<th>Assessment Design</th>
<th>Use of Data</th>
<th>What It Looks Like</th>
</tr>
</thead>
<tbody>
<tr>
<td>Checking For Understanding</td>
<td>Assessments are backwards-planned to check for understanding on daily objectives, and provide immediate feedback and accountability to students</td>
<td>Teacher recognizes patterns in the data and adjusts instruction for significant needs. Teacher builds class focus on mastery and celebrates the movement of the class toward mastery</td>
<td>Teacher projecting real-time data on the wall; students working on an exit ticket, HW Check, practice session, quiz, or flipped classroom</td>
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<table>
<thead>
<tr>
<th>ADVANCED INSTRUCTIONAL USES</th>
<th>Assessment Design</th>
<th>Use of Data</th>
<th>What It Looks Like</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Agency and Ownership</td>
<td>Assessments are tightly aligned to an established list of learning targets, and are frequent, student-facing measures of student mastery on those goals</td>
<td>Teacher personalizes intervention by creating a culture of student ownership and reflection. Students track data and engage in frequent error analysis to build growth mindsets</td>
<td>Students using immediate feedback to seek peer support, learn from mistakes, and track their mastery over class learning targets.</td>
</tr>
</tbody>
</table>

| Critical Questioning Strategies | Assessments include polls and open-ended responses, and are designed to deepen student understanding on higher levels of Bloom’s / DOK taxonomy through analysis and discussion | Teacher leverages data to create opportunities for deeper learning, primarily through strong questioning techniques and rigorous student talk | Students debating and discussing high-rigor Polls, Quickets, or DOK 3+4 questions; Teacher using the data to facilitate student talk. |

| Differentiation | Assessments include leveled questions and are designed to be diagnostic levers, used to make instructional decisions about student groupings | Teacher uses real-time data to adjust class structure, identify leveled groups, and facilitate stations where students work at their own learning level | Students working in leveled, small groups; Teacher using diagnostic data in Teacher View to organize students. |
Basic Instructional Uses of ExitTicket

Checking for Understanding

The primary use of ExitTicket is simply checking for student understanding. In this basic strategy, teachers use ExitTicket to assess students in a more engaging, productive, and immediate way. The Projector Mode (right) gives students a sense of belonging and accountability, while immediate feedback (below) increases engagement. Meanwhile, as ExitTicket tabulates and analyzes the data real time, teachers can immediately respond to data on student progress without collecting or grading papers. An academic culture permeates the classroom as students and teacher share in the real-time formative assessment process.

The most common uses in this strategy are homework checks, exit tickets, launches/do-nows, practice sessions, mock exams, and quizzes for a flipped classroom. Teachers usually project anonymous ExitTicket data on the wall during the assessment in order to engage students with whole-class data, often setting class goals about mastery and encouraging students to improve through this public, group recognition. The data in ExitTicket makes the impact of pedagogical decisions more readily obvious. Teachers can quickly identify particular topics that students struggled with, or daily objectives that were particularly challenging to teach and modify their instruction accordingly. Using the heatmap, teachers can adjust instruction in real-time. Alternately, the scorebook feature captures data for daily or long-range planning, allowing teachers to make data-driven decisions about future lessons.

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Real-Time Intervention

Once teachers have become comfortable with the technology and procedures necessary to check for understanding, they may begin making real-time interventions part of their classroom routine. In this strategy, teachers start to focus more on the ExitTicket Teacher Mode, which provides individualized data on each student. Becoming proficient with managing two devices at once -- logged in to both the Projector Mode and the Teacher Mode -- is often a key step for teachers on this level. Because the Teacher Mode makes student skill gaps more obvious and readily identifiable in the moment of assessment, teachers may develop strategies to better address those student needs. This change in instructional practice is designed to provide corrective feedback when it matters most. Students in these classrooms are aware that a wrong answer will often prompt a 1-on-1, small-group, or whole-group response from the teacher designed to target their misunderstanding or mistake.
The most common strategies of real-time intervention are **1-on-1 “over-the-shoulder” interventions, small-group reteaching, and whole-class reteaching**. Teachers who focus on 1-on-1 interventions often circulate with an iPad or tablet, checking in with students individually to help them identify errors and address a specific skill in the moment. Teachers may also use ExitTicket to support whole-class reteaching after an assessment, or when an assessment is completed. By using the projector’s Reteach page, they are able to guide student analysis of common errors and prompt a basic class discussion about right and wrong answers. Teachers using this strategy of use are able to comfortably leverage all the technical features of ExitTicket to respond in the moment to their students’ data.

**Managing the “Flow” of Real-Time Intervention:**

**Lesson Planning**
- Decide on a learning objective
- Create leveled questions to assess student mastery on that skill
- Create challenge or open-ended poll extension question(s)
- Schedule assessment

**Logging in and Setting In-Class Expectations**
- While students are logging in, log in to the Teacher Mode with your iPad/smartphone
- Explain volume level, how to get help when stuck, what to do when done or finished early

**Projecting Anonymous Results**
- Project the Projector Mode from your computer
- Click View on the class period in session
- Find the assessment you want and click Start to make it visible

**1-on-1/Small-Group Interventions**
- Open up the assessment from the Teacher Mode on your iPad/smartphone
- Walk around checking in with students who put wrong answers
- Pull small groups with common errors

**Whole-Class Reteaching/Error Analysis**
- Project the Reteach page when students are done with the assessment
- Ask students for explanations of why different answers are incorrect

**VIDEOS:** *Whole Class Reteaching* and *Small Group Reteaching*

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**Advanced Instructional Uses of ExitTicket**

### Student Agency and Ownership

Once teachers have become comfortable with the real-time intervention strategies described above, they may begin to find that teacher-centric interventions do not fully address the diverse needs in the classroom. As a result, many teachers begin to intentionally incorporate strategies to give more ownership and agency to their students. The defining characteristic of this shift is that the teacher has create structures and routines in class (outside of ExitTicket’s basic functionality) that invest students in their own data over time and give them avenues to take action. These routines are focused on **students being responsible for their own data, teachers emphasizing growth, and the process of learning from one’s own mistakes**. Teachers find that increasing students’ agency and ownership not only greatly accelerates their progress, but also frees teacher time to focus on individualized intervention and small-group reteaching.

One of the most common strategies to enhance student agency and ownership is **data tracking**. Through the use of public or private mastery trackers, students can see their progress in terms of whole-group or individual achievement. Another strategy is the use of **self-reflection and peer-support protocols**, which support agency and ownership by teaching students how to identify their own needs and then seek out information from each other.

Teachers focused on this strategy must explicitly support the building of **growth mindsets** in their students by celebrating wrong answers as opportunities for learning and teaching students how to respond productively to errors and misunderstandings. Peer instruction and providing **multiple avenues for support** empowers students to respond to their own data. These strategies may be accompanied by giving students a pre-defined list of class learning targets - on which students can track their own growth using student-facing measures of mastery from ExitTicket.

**Example Learning Target Self-Tracker**

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Critical Questioning Strategies

In this strategy, teachers are focused on leveraging the real-time data from ExitTicket to increase rigor and critical thinking in their students. Using the Projector Mode’s graphs of class-wide answer choices, teachers call on students to **defend their answers, explain their reasoning, evaluate different approaches, or analyze their errors.** In order for these discussions to be powerful, the teacher must create higher-level DOK questions and/or ones with intentionally controversial or “distractor” answers. The depth of these discussions can also be increased by choosing to keep the correct answer hidden from students until after the exploration.

The ExitTicket Poll Feature is deliberately structured to have **no right or wrong answer** -- it is meant to invite debate, collect open-ended responses, or spark inquiry. As such, it is commonly used as part of an anticipatory set as an introduction to a lab, reading, or lecture. Polls provide an opportunity for students to conjecture, reason, and defend their answers with groups or the whole class. Common questions stems include “Which of the following is the *best* explanation...” and “Which of the following is an incorrect way of...” To scaffold high-level partner talk, teachers may post academic question stems on the wall for students to use.

A teacher who is proficient at adjusting questioning strategies to address the data they are receiving real-time can also leverage **the ExitTicket “Quicket” feature.** Using Quicket, he or she can simply ask a question out loud -- or write it on the board or a PowerPoint -- while students submit their response. Answers can be recorded in the scorebook, or not. Open-ended questions may be graded along a rubric, or compared and analyzed publicly to stimulate rigorous thinking and student voice.

**Managing the “Flow” of Questioning:**

- **Lesson Planning**
  - Write open-ended questions that target higher levels of Bloom’s Taxonomy/DOK
  - Use multiple correct answers for students to debate and discuss
- **Logging In**
  - In your preferences, choose Never Log Out for students
  - Have students login at the start of class and stay logged in throughout questioning
- **Presenting the Question**
  - Ask the question out loud; give processing time before making it visible in ExitTicket
  - Find the assessment in the Projector Mode and press Start to make visible
- **Discussing**
  - Use Reteach page in the Projector Mode to facilitate public analysis and debate
  - Begin with partner talk; encourage ownership
  - “Re-poll” after discussion
Differentiation

The primary focus of the differentiated approach is ensuring that students are all working in their Zone of Proximal Development (ZPD) during class. In this strategy, teachers leverage the real-time data from ExitTicket to adjust student groupings, interventions, and activities in the moment of assessment, ensuring that students are working in their ZPD as much as possible. Diagnostic data is often collected at the start of class to engage students in this process of growth. Because ExitTicket provides tangible data and evidence of learning in the moment, students are more able to take more ownership over their mastery level. **What's more, teachers are able to make instructional decisions based on hard, in-the-moment data**, which feels more fair to students than other methods of grouping. Teachers who use ExitTicket for differentiation tend to be comfortable with many methods of intervention, but have found -- often through the process of checking for understanding daily -- that the complex array of student need in their classroom necessitates a differentiated approach.

A common strategy used in the process of differentiation is stations and rotations. Diagnostic data from the start of class tells students where to go, and re-assessments at each station give them a sense of growth and accountability. In this process, a teacher will often leverage peer instruction, reciprocal teaching, and/or small group instruction, along with meaningful differentiated activities or texts at each station. Data tracking is pervasive in this environment. While the “groups” features is available in ExitTicket for teachers who want to plan for specific students to take specific tickets, the immediate feedback that ExitTicket provides also gives students the ability to know what group to go to without the teacher having to identify students publicly.

**VIDEO: Differentiation**

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**Personalized, Student-Centered Learning**

**Blended Learning/Self-Paced Learning**

Many teachers and schools find that a powerful way to maximize student learning is to have students do a significant chunk of their learning online, with direct instruction happening less frequently and often in small groups. Videos and online content allow students to learn at their own pace and learning level, taking assessments on ExitTicket when they have reached mastery. This means students are able to move along multiple pathways to mastery, often at different paces. ExitTicket's immediate feedback provides actionable data to both student and teacher in this process, ensuring that students receive the intervention and support that they need to be successful along their own learning goals. The teacher’s role, meanwhile, shifts from lecturer to facilitator of learning.
ExitTicket facilitates this transition to a more personalized, self-directed learning experience through several essential instructional practices. First of all, students can track their progress along a very clear set of learning goals as they master the basic course content online. The teacher can assign each student his/her own personal playlist of videos, practices, and resources on a shared Google Doc while students check their understanding on each concept through ExitTicket. Secondly, the real-time data allows teachers to quickly determine student need and identify small groups for intervention. In the station/rotation model of blended learning, students can rotate through teacher-led stations to apply their learning, think critically, and learn collaboratively. Because students are mastering the necessary skills and basic content online, the teacher is freed to push students in the direction of deeper learning, using ExitTicket’s assessment results as a guide.

**VIDEO:** Chemistry Blended Review

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**Leadership Public Schools, Changing Ed Tech Development**

Part of the LPS mission is to operate as a “research and development” organization innovating replicable products and practices that address critical issues in urban education. To this end, we have developed an explicit design and incubation process. Called “collaborative innovation,” this process has created new roles and a new professionalism for LPS teachers. At the same time it is serving as an R & D laboratory for ExitTicket and other products including ones in the incubation pipeline. Our four high schools range from 60% to 94% low-income. Our aim is to flip traditional technology development: addressing the most difficult educational issues by embedding R & D in the most challenging contexts – and then spinning off the results to others for dissemination.

Two Case Studies commissioned by the William and Flora Hewlett Foundation describe this process in greater detail.

**Leveraging Open Education Resources to Increase Student Achievement and Teacher Professionalism**

**Supporting and Sustaining Innovation: The ExitTicket Case Study**

“LPS is the best example of a collaborative and distributed innovation agenda across a network of schools”

Tom Vander Ark in Getting Smart blog, 8/20/12