Using Digital Learning Data to Drive Instruction

November 5, 2012

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In recent years, school reformers have embraced data-driven decision making as a central strategy for improving much of what is wrong in public education. The appeal of making education decisions based on hard data…stems partly from the idea that data can make the source of a problem clearer and more specific.[1]

In an era of educational accountability, schools and districts continually look for effective ways to improve student outcomes. One strategy involves the incorporation of data from informal and formal assessments as a means of informing and modifying future instructional practices.[2] Using student data to make instructional and school-level decisions is frequently referred to as data-driven decision making.[3,4] Through data-driven decision making, teachers and administrators collaborate on how to use student performance data to guide instruction, and improve student achievement.[5] Specifically, teachers use the data to identify areas of difficulty and to make changes to instruction for the whole class, small groups, or individual students.[6] By focusing on actual data, teachers are better able to target specific student needs in a timely manner and respond accordingly.

Archipelago Learning's suite of supplemental digital learning products provide teachers with a wide array of student performance data for Pre-Kindergarten through Post-Secondary classrooms. These digital learning products are presented as an example of effective digital tools that provide detailed assessment and performance data and can be used to improve instructional practices and student outcomes.

Links Between Data-Driven Instruction and Student Achievement Outcomes

Multiple research studies demonstrate the benefits of using achievement and performance data to drive classroom instruction. Previously teachers used the results of standardized or interim assessments to inform or guide instruction, and in turn, improve student outcomes.[7] While standardized assessment data supplies helpful summative measures of student achievement, studies find that ongoing progress monitoring assessments are more informative than less frequent tests (e.g., state assessments), because of their recurring frequency, timeliness, and curriculum alignment.[8,9] Providing progress monitoring data directly to students and teachers offers a set of unique achievement benefits, as described below.

Student benefits. Studies find that students benefit from seeing the results of their efforts. Specifically, when students have goals for their work and receive timely feedback on their progress, they have higher self-efficacy and greater achievement outcomes compared to students who only receive an overall objective.[10,11] Furthermore, when students receive

How Archipelago Learning Digital Products Benefit Students and Teachers

- *Provide students with immediate feedback on their performance and instructional goals*
- *Take the guesswork out of progress monitoring and data analysis*
- *Provide teachers with access to up-to-date reports on student learning and achievement*

continuous performance feedback from teachers or digital learning programs they achieve at higher levels compared to classrooms where students do not receive ongoing feedback.[12,13,14] As a result, when students have continuing involvement in their learning and a greater understanding of performance, self-perceptions and achievement outcomes improve.

Teacher benefits. Studies find that when teachers monitor student progress and utilize graphs to track data over time, teachers obtain an ongoing assessment of student performance and can better customize their teaching to meet student learning needs.[15,16] Additionally, when teachers utilize a formal progress monitoring system, such as a digital learning program, they are more effective at improving student skills compared to when teachers create their own progress monitoring systems.[17] Furthermore, teacher receipt of detailed student performance reports from computerized progress monitoring assessments is related to greater student achievement, compared to classrooms where teachers do not receive detailed information on student learning.[18] Finally, when teachers receive explicit instructional recommendations based on student performance data, students have higher performance, and teachers make more frequent instructional modifications.[19,20]

How to Implement Data-Driven Decision Making

How can teachers effectively implement data-driven decision making in their classrooms? Multiple studies have established several strategies teachers should use when making data-driven decisions.

1) Teachers should have an online system to manage student data. Several studies suggest that digital programs used to manage student data and draw attention to student weaknesses can be helpful in informing instruction.[21,22,23,24,25,26] Specifically, digital learning programs that allow for the aggregation of student data by class, content area, or type of assignment can support teachers in identifying specific students who might need additional assistance, and in noting performance patterns.[27]

Studies also find that online data management systems increase utility and time efficiency. Specifically, when data is available to teachers online, they are more likely to use the data to inform instruction.[28] The user-friendly reports provided by online systems can also support utility by illustrating how student performance relates to specific standards.[29,30] Additionally, with a comprehensive data source on student learning, online systems enable teachers to be more time efficient in meeting student needs.[31] Taken together, online systems can support teachers in tracking, managing, understanding, and utilizing student data.

2) Data-driven decision making should be an ongoing part of instructional and school practice. Teachers and schools need to make data use a priority. First, teachers should use digital programs to analyze data and determine instructional strategies for improving student learning.[32,33] Then, teachers should implement these instructional strategies to test the strength of their suggested modifications and to determine if student learning improves. Some strategies include giving students more time, changing the curriculum order, finding new ways to teach concepts, and differentiating instruction.[34,35]

3) Teachers should consult a wide variety of sources. One assessment (e.g., standardized state test) is not enough to inform instructional practices or affect student achievement outcomes. Rather, teachers should review a wide variety of data on student learning needs over time (e.g., digital progress monitoring assessments, chapter or lesson tests).[36,37,38,39,40] If teachers notice a problem on one assessment, they should check other sources for confirmation.[41] For example, if a teacher is concerned that her students are having difficulty with nonfiction writing based on state assessment results, she then should confirm by reviewing digital learning progress monitoring assessments. Ultimately, it is more effective to collect and utilize data over time, rather than focusing solely on the results of one assessment.[42]

4) Teachers should receive support in understanding student data. The simple receipt of data does not make interpretation clear. Teachers need support, guidance, and professional development to best understand and utilize classroom assessment data in guiding decision making.[43,44,45,46] Schools can establish an overall supportive culture of data-driven decision making by creating a clear message that describes appropriate ways to use student data.[47,48,49,50] For example, schools could provide additional time in grade-level and school-level instructional planning meetings for teachers to review and receive assistance in the interpretation of student data.

Support in understanding data also increases the likelihood that teachers will use it effectively.[51] Studies show that when teachers receive professional development on how to use student achievement data, students see significantly greater gains in achievement.[52,53,54,55] Schools should try to find ways to provide time for staff to collaborate on how to learn from and use data.[56,57,58,59] By engaging in peer conversations teachers can co-develop strategies for accommodating specific learning needs.

How Archipelago Learning Digital Products Support Data-Driven Decision Making

- *Online assessment management systems provide teachers and students with clear and descriptive information on student performance*
- *Allow schools to seamlessly integrate data into the classroom*
- *Provide teachers with a wide variety of assessment feedback, collected over time*
- *Give teachers explicit information on areas of strength and weakness for students*
- *Teachers can easily share assessment results with other educators who are involved in a student's education*
- *Include performance data for all students, regardless of ability level*
- *Students can view their progress over time*

5) Teachers should focus on the needs of all students. Teachers should strive to support all students when considering data, not just those students on the bubble or with low performance.[60] By considering student data for the entire classroom, teachers can understand

individual student needs and areas where more support is needed.[61] When teachers seek to understand their students' needs through data-driven decision making, the whole class directly benefits.

6) Students should be involved in data-driven decision making. Students should be engaged in the data decision-making process with teachers. This allows students to monitor their own performance, and set individual goals.[62,63] When involving students in the decision making process, students should receive feedback and be equipped to learn from that feedback (e.g., rubrics). Teachers can then use student interpretations of their data to guide instructional modifications. By allowing students to monitor their progress, students are able to increase engagement in the subject area and develop a sense of control over their learning.[64,65] Digital programs that provide clear objectives and feedback on performance offer one method for supporting students in this area.[66]

The benefits of data-driven decision making are strengthened when teachers utilize online systems for data management, consult a wide variety of data sources, receive support in understanding data, and consider all student needs in the process. Furthermore, establishing data-driven decision making as a part of the school culture and including students in the process serves to build teacher, school, and district capacity for using learning and achievement data to enhance instruction.

Archipelago Learning Digital Products Provide Data to Drive Instruction

Archipelago Learning offers a suite of Pre-Kindergarten through Post-Secondary education supplemental digital learning products, including Study Island, EducationCity, Reading Eggs, Reading Eggspress, ESL ReadingSmart, ReadingMate, and Northstar Learning. Each product provides teachers with unique information on individual student needs based on built-in performance and progress monitoring data. All products provide teachers with a snapshot of student progress. One product, ESL ReadingSmart, provides English language learners with tailored instruction designed to develop English language proficiency. The program continually updates teachers on student progress through the use of reports on student performance.

Through the multiple assessment opportunities offered in all seven digital learning programs, students receive immediate performance feedback. For instance, ReadingMate, provides supplemental instruction to students who struggle in reading. As students work through the program, they are continually informed of their progress.

All products provide teachers with suggested instructional modifications based on student needs, promote the integration of data-driven decision making into classroom routines, and offer teachers a wide variety of assessment data, collected over time. For example, Reading Eggs and Reading Eggspress provide teachers with continual feedback and student data on progress toward mastery of critical reading components (e.g., phonics, vocabulary, comprehension). Additionally, Study Island offers RTI reporting, which gives teachers the opportunity to track student progress by highlighting areas of difficulty and detailing when educational standards are or are not met. Study Island also suggests instructional modifications based on student performance results.

Each Archipelago Learning product provides supplementary instruction for all students in a classroom, regardless of ability level, giving each student a chance to build upon current skills. For example, EducationCity provides teachers with interactive lesson plans related to state and Common Core State standards and provides support for whole class, small group, and individual instruction. Students also have the opportunity to practice and build upon standards learning through online games and assessments.

Finally, all products allow students to individually view their own progress and receive tailored improvement feedback. Another product, Northstar Learning provides college students with immediate and corrective feedback on their progress toward mastery of content on career and college course exams.

Archipelago Learning's products support data-driven decision making and provide schools with a unique progress monitoring interface that allows students and teachers to use data to guide instruction. Teachers are equipped with ongoing opportunities to review results and see positive change over time. They are given the tools to track student progress and respond with instructional modifications specific to student needs. Archipelago Learning's digital products offer a unique source of informative support aimed at understanding how student learning and achievement data can positively transform instruction.

References

[1] Christman, J. B., Neild, R. C., Bulkley, K., Blanc, S., Liu, R., Mitchell, C., & Travers, E. (2009). *Making the most of interim assessment data: Lessons from Philadelphia*. Philadelphia, PA: Research for Action. Retrieved from http://www.eric.ed.gov/ERICWebPortal/detail?accno=ED505863

[2] Mandinach, E. B. (2012). A perfect time for data use: Using data-driven decision making to inform practice. *Educational Psychologist, 47*(2), 71-85. doi: 10.1080/00461520.2012.667064

[3] Kennedy, B. L. & Datnow, A. (2011). Student involvement and data-driven decision making: Developing a new typology. *Youth & Society, 43*(4), 1246-1271. doi: 10.1177/004418X10388219

[4] Mandinach (2012)

[5] Bowers, A. J. (2008). Reconsidering grades as data for decision making: More than just academic knowledge. *Journal of Education Administration, 47*(5), 609-629. doi: 10.1108/09578230910981080

[6] Marsh, J. A., Pane, J. F., Hamilton, L. S. (2006). *Making sense of data-driven decision making in education*. Santa Monica, CA: RAND Corporation. Retrieved from http://www.rand.org/pubs/occasional_papers/OP170.html

[7] Clune, W. H. & White, P. A. (2008). *Policy effectiveness of interim assessments in Providence Public Schools* (WCER Working Paper No. 2008-10). Madison: University of Wisconsin-Madison, Wisconsin Center for Educational Research. Retrieved from http://www.wcer.wisc.edu/publications/workingPapers/papers.php

[8] Marsh, Pane & Hamilton (2006)

[9] Stecher, B. M., Epstein, S., Hamilton, L. S., Marsh, J. A., Robyn, A., McCombs, J. S., Russell, J., & Naftel, S. (2008). *Pain and Gain: Implementing No Child Left Behind in Three States, 2004-2006*. Santa Monica, CA: RAND Corporation. Retrieved from http://www.rand.org/pubs/monographs/2008/RAND_MG784.pdf

[10] Schunk, D.H. & Rice, J.M. (1991). Learning goals and progress feedback during reading comprehension instruction. *Journal of Reading Behavior, 23*, 351-364.

[11] Schunk, D.H., & Swartz, C.W. (1993). Goals and progress feedback: Effects on self-efficacy and writing achievement. *Contemporary Educational Psychology*, *18*, 337-354.

[12] Baker, S., Gersten, R., & Lee, D. (2002). A synthesis of empirical research on teaching mathematics to low-achieving students. *The Elementary School Journal, 103*, 51-73.

[13] Clymer, J. B. & Wiliam, D. (2007). Improving the way we grade science. *Educational Leadership, 64*, 36-42.

[14] Robinson, S.L., DePascale, C., Roberts, F.C. (1989). Computer-delivered feedback in group-based instruction: Effects for learning disabled students in mathematics. *Learning Disabilities Focus, 5*, 28-35.

[15] Baker, Gersten & Lee (2002)

[16] Fuchs, L. S., Fuchs, D., & Hamlett, C. L. (1989). Monitoring reading growth using student recalls: Effects of two teacher feedback systems. *The Journal of Educational Research, 83*(2), 103-110.

[17] Wesson (1991)

[18] Fuchs, L. S., Fuchs, D., Hamlett, C. L., & Allinder, R. M. (1991). The contribution of skills analysis to curriculum-based measurement in spelling. *Exceptional Children, 57*(5), 443-452.

[19] Fuchs, L. S., Fuchs, D., Hamlett, C. L., & Ferguson, C. (1992). Effects of expert system consultation within curriculum-based measurement, using a reading maze task. *Exceptional Children, 58*(5), 436-450.

[20] Fuchs, L.S., Fuchs, D., Hamlett, C.L., Phillips, N.B., & Bentz, J. (1994). Classwide curriculum-based measurement: Helping general educators meet the challenge of student diversity. *Exceptional Children, 60*, 518-537.

[21] Datnow, A., Park, V., & Wohlstetter, P. (2007). *Achieving with Data: How high-performing school systems use data to improve instruction for elementary students*. Los Angeles, CA: Center on Educational Governance, University of Southern California. Retrieved from http://www.usc.edu/dept/education/cegov/focus/education-reform/publications/books-chapters/Achieving%20with%20Data-How%20High%20Performing%20Schools%20Use%20Data[1].pdf

[22] Goertz, M. E., Oláh, L. N., & Riggan, M. (2010). *From Testing to Teaching: The Use of Interim Assessments in Classroom Instruction*. CPRE Research Report # RR-65. Consortium for Policy Research in Education.

[23] Hamilton, L., Halverson, R., Jackson, S., Mandinach, E., Supovitz, J., & Wayman, J. (2009). *Using student achievement data to support instructional decision making* (NCEE 2009-4067). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Retrieved from http://ies.ed.gov/ncee/wwc/publications/practiceguides/.

[24] Mandinach (2012)

[25] Marsh, J. A., Pane, J. F., Hamilton, L. S. (2006). *Making sense of data-driven decision making in education*. Santa Monica, CA: RAND Corporation. Retrieved from http://www.rand.org/pubs/occasional_papers/OP170.html

[26] Petersen, J. L. (2007). Learning facts: The brave new world of data-informed instruction. *Education Next*, *7*(1), 36-42.

[27] Hamilton et al. (2009)

[28] Marsh, Pane & Hamilton (2006)

[29] Datnow et al. (2007)

[30] Goertz, Oláh & Riggan (2010)

[31] Wayman, J. C. & Stringfield, S. (2006). Technology-supported involvement of entire faculties in examination of student data for instructional improvement. *American Journal of Education, 112*(4), 549-571. doi: 10.1086/505059

[32] Buzhardt, J., Greenwood, C., Walker, D., Carta, J., Terry, B., & Garrett, M. (2010). A web-based tool to support data-based early intervention decision making. *Topics in Early Childhood Special Education, 29*(4), 201-213. doi: 10.1177/02711121409353350

[33] Hamilton et al. (2009)

[34] Buzhardt et al. (2010)

[35] Hamilton et al. (2009)

[36] Datnow et al. (2007)

[37] Hamilton et al. (2009)

[38] Jacobs et al. (2009)

[39] Mandinach (2012)

[40] Supovitz, J. A. & Klein, V. (2003). *Mapping a course for improved student learning: How innovative schools systematically use student performance data to guide improvement*. Philadelphia, PA: Consortium for Policy Research in Education (CPRE). Retrieved from http://www.centerforcsri.org/research/improvement.cgi?st=s&sr=SR003724

[41] Hamilton et al. (2009)

[42] Jacobs et al. (2009)
[43] Buzhardt et al. (2010)
[44] Datnow et al. (2007)
[45] Jacobs et al. (2009)
[46] Marsh, Pane & Hamilton (2006)
[47] Datnow et al. (2007)
[48] Hamilton et al. (2009)
[49] Jacobs, J., Gregory, A., Hoppey, D., & Yendol-Hoppey, D. (2009). Data literacy: Understanding teachers' data use in a context of accountability and response to intervention. *Action in Teacher Education, 31*(3), 41-55.
[50] Marsh, Pane & Hamilton (2006)
[51] Marsh, Pane & Hamilton (2006)
[52] Carlson, D., Borman, G. D., & Robinson, M. (2011). A multistate district-level cluster randomized trial of the impact of data-driven reform on reading and mathematics achievement. *Educational Evaluation and Policy Analysis, 33*(3), 378-398. doi: 10.3102/0162373711412765
[53] Christman et al. (2009)
[54] Jinkins, D. (2001). Impact of the implementation of the teaching/learning cycle on teacher decision-making and emergent readers. *Reading Psychology, 22*, 267-288.
[55] Marsh, J. A., McCombs, J. S., & Martorell, F. (2010). How instructional coaches support data-driven decision making: Policy implementation and effects in Florida middle schools. *Educational Policy, 24*(6), 872-907. doi: 10.1177/0895904809341467
[56] Datnow et al. (2007)
[57] Hamilton et al. (2009)
[58] Marsh, Pane & Hamilton (2006)
[59] Wayman & Stringfield (2006)
[60] Hamilton et al. (2009)
[61] Jacobs et al. (2009)
[62] Datnow et al. (2007)
[63] Hamilton et al. (2009)
[64] Kennedy & Datnow (2011)
[65] Hamilton et al. (2009)
[66] Hamilton et al. (2009)

Appendix. Effect Sizes of Research

To understand the strength of a set of findings, readers can take effect sizes into consideration. Effect sizes explain the difference in standardized deviation between two groups of interest. In other words, an effect size of 1.00 means that an average person in the treatment condition scored 1 standard deviation, or 32 percentile points, higher than the average person in the control condition. The table below details the effect sizes of referenced studies when effect sizes were available.

Area	Range of effect sizes
Student Access to Progress Monitoring Data and Student Achievement[67,68,69,70,71]	0.27 to 2.47
Teacher Access to Progress Monitoring Data and Student Achievement[72,73,74,75,76]	0.29 to 1.78
Professional Development/Teacher Support and Student Achievement[77,78]	0.21 to 0.28

[67] Baker, Gersten & Lee (2002)
[68] Clymer & Wiliam (2007)
[69] Robinson, DePascale, & Roberts (1989)
[70] Schunk & Swartz (1993)
[71] Schunk & Rice (1991)
[72] Baker, Gersten, & Lee (2002)
[73] Fuchs, Fuchs, & Hamlett (1989)
[74] Fuchs, Fuchs, Hamlett, & Allinder (1991)
[75] Fuchs, Fuchs, Hamlett, & Ferguson (1992)
[76] Fuchs, Fuchs, Hamlett, Phillips, & Bentz (1994)
[77] Carlson, Borman, & Robinson (2011)
[78] Christman et al. (2009)