

The Bridge Report: Bringing Learning Analytics to Low-Income, Urban Schools

Aaron Hawn

Opportunity Charter School

240 W. 113th Street

New York, NY 10026

aaronhawn@opportunitycharter.org

ABSTRACT

Widespread adoption of learning analytics for risk prediction faces different challenges at low-income secondary schools than at post-secondary institutions, where such methods have been more widely adopted. To leverage the benefits of learning analytics for under-resourced communities, educators must overcome the barriers to adoption faced by local schools: internet access, data integration, data interpretation, and local alignment. We present the case study of an enhanced reporting tool for parents and teachers, the Bridge Report, locally designed to meet the needs of a low-income secondary school in New York City. Parent and Teacher focus groups suggest that addressing local obstacles to learning analytics can create conditions for enthusiastic adoption by parents and teachers.

Categories and Subject Descriptors

H.1.2 [User/Machine Systems]: Human factors, Human information processing; K.3.1 [Computers and Education]: Computer Uses in Education – Computer-assisted instruction

General Terms

Design, Human Factors

Keywords

Instructor Support, Predictive Analytics, Learning Analytics, Risk Prediction

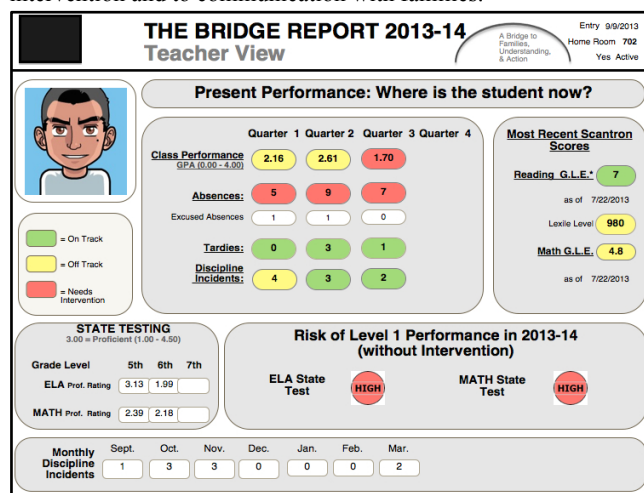
1. INTRODUCTION & CHALLENGES

As learning analytics interventions expand from higher education to K-12 contexts, established post-secondary methods will not simply trickle down to local schools. Predictive analytics and reporting methods that work for undergraduates and university administrations must adapt to low-income elementary and secondary contexts to ensure widespread adoption. With low-income students making up almost half of the nation's public school population, closing the learning analytics cycle [3] with effective interventions for these students offers large opportunities for positive academic impact. We study methods to enhance K-12 learning analytics adoption by collaboratively designing solutions to the challenges faced by one New York City charter school, serving high-need secondary school students: 70% African-American, 30% Hispanic, and 70% qualifying for free/reduced lunch. The case study school faces challenges to learning analytics adoption similar to those faced by low-income schools across the

United States: lack of internet access [7], data fragmentation [2], limited data interpretation skills [5], and the neglect of local context.

2. THE BRIDGE REPORT

In an effort to overcome these obstacles to learning analytics adoption, the school created a new reporting intervention, the Bridge Report, to serve as a “bridge” to effective academic intervention and to communication with families.



Initial report drafts were used as the basis for feedback in interviews with school administrators, learning specialists, social workers, and teachers. After each round of feedback, the report's design was edited in an iterative process guided by the school's Director of Analytics, who served as data guide or “wrangler” for the larger instructional process [4]. Extensive feedback was used to establish intervention thresholds for attendance, GPA, discipline, and other measures. Figure 1 provides an example of one student's data presented in the Teacher View.

The current design and data elements of the Bridge report are created in response to the particular challenges of low-income secondary schools. In order to overcome families' lack of internet access, for example, the Bridge Report is distributed on a quarterly basis in hard copy, as a supplement to the traditional report card. To overcome a lack of data integration for both teachers and families, developers combine data from several online systems and data silos within the SIS. Figure 1 illustrates the integration of several important indicators from distinct data sources: quarterly GPA, absences, tardiness, discipline incidents, state testing scores, Grade Level Equivalents in reading and math, and Lexile scores. Combined in one report, these data provide more holistic and efficient grounds for academic decision-making.

To address obstacles to local school alignment, the color of most Bridge Report elements (red, yellow, or green) is determined by a set of school-defined thresholds for intervention. Use of

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the Owner/Author.

Copyright is held by the owner/author(s).

LAK '15, Mar 16-20, 2015, Poughkeepsie, NY, USA

ACM 978-1-4503-3417-4/15/03.

<http://dx.doi.org/10.1145/2723576.2723652>

red/yellow/green follows Course Signals' successful traffic light motif, which was found informative for students [1]. Color thresholds represent both local and state criteria and provide essential context for stakeholders involved in academic decisions.

The most controversial feature included in the report, for both teachers and parents, is a predictive risk indicator for Level 1 performance on New York State ELA and Mathematics Tests. Level 1 is the lowest of four proficiency levels, and indicates student performance well-below proficiency. Interviews with school staff indicated concern that negative predictions might demotivate students. These concerns about student motivation stand in contrast to survey feedback received on Purdue's Course Signals intervention system, where 74% of students reported that Course Signals improved their motivation [1]. College students, however, differ significantly from middle school students, and further study is needed to gauge the impact of predictive reporting directed toward this younger population.

Models used to generate the "Risk of Level 1 Performance" have relied on linear regression, within a standard cross-validation paradigm and have included features such as Computer Adaptive Testing Pre-test scores, Days Present/Tardy, IEP Status, Grade Level, and Office Discipline Referral Count. The most recent models have achieved a cross-validated correlation to end-of-year state test scores of $r=0.748$ for ELA and $r=0.669$ for Math.

3. FEEDBACK

A small number of parent interviews were conducted individually during parent/teacher conferences ($n=6$). Parents were given a copy of the Bridge Report for their own child, and interviewers recorded their verbal response to survey questions about the report. Focus group sessions with most of the school's middle school teachers ($n=22$) were conducted as well. Grade-level sets of reports were distributed to teachers and, after an introductory session, teachers gave feedback through an anonymous survey.

3.1 Parent Feedback

Overall, the small number of parents interviewed responded very positively to the report, especially to the inclusion of red, yellow, green color cues and to the variety of information presented. Over 80% of parents "Agreed" or "Strongly Agreed" with the following statements: (1) This report will help me make decisions about my child's education, (2) This report will help me have effective conversations with teachers and administrators, and (3) This report matches my own understanding of my child in school.

In agreement with many teacher comments, parents indicated a high-level of engagement with risk predictions about their child's state test performance. 100% agreed or strongly agreed that (1) the student risk predictions seemed accurate, that (2) as parents, they took the predictions seriously, and that (3) these risks would impact their academic decisions.

Parents were also asked to use the report to "talk about" their child's strengths and weaknesses in school. The interviewer then judged the accuracy of the parent's understanding in relation to the information contained in the report. Overall, 69% of parent interpretation was "Very Accurate" or "Mainly Accurate," without any previous instruction in interpreting the reports.

3.2 Teacher Feedback

Overall, teachers were enthusiastic about the Bridge Report. Comments included: "This is great! I can't wait to use this and the ease of understanding is very helpful." "We have all the information for each of our students in one place." Teachers were

able to suggest many possible uses for the Bridge Reports: parent and student conferences, lesson planning, and determining academic interventions.

Teacher positive comments about utility and ease of use suggest that the project goals of data integration, ease of interpretation, and local alignment may have been achieved. More than 80% of teachers agreed or strongly agreed that (1) These reports will be useful to me and (2) These reports will help me make more effective academic decisions. Only 18% of teachers indicated some concern that the reports might bias their behavior towards students. When asked, "How could these reports be more useful?" teachers often responded with comments about increased local alignment, requesting more specific information on students' current participation and performance in intervention services.

When asked about including risk predictions on reports, teachers were positive about parents and fellow teachers receiving predictions but conflicted about students receiving the same predictions. For example, one teacher wrote: "Predictions are definitely beneficial for both the teachers and the parents, as it gives both the time to plan interventions accordingly." Responses to including predictions for students, however, were mainly negative: "I don't think it would be necessary to have it on the copy for students. I feel like that would cause a lot of anxiety for our students, who already have high enough anxiety about the state tests." Or, "Students can change anytime, so I do not think I would include predictions. That is just making an assumption based on current performance and students need a chance to redeem themselves."

4. FUTURE WORK

Continuing work during the 2014-15 school year will explore the motivational impact of student-facing reporting in an attempt to position the Bridge Report as one piece of a comprehensive and impactful learning analytics intervention [cf.6].

5. REFERENCES

- [1] Arnold, K E. and Pistilli, M. D. 2012. Course Signals at Purdue: Using Learning Analytics to Increase Student Success. In *Proceedings of the 2nd International Conference on Learning Analytics and Knowledge*. 267-270.
- [2] Benjamin, H. 2014. Tearing Down the Walls Between Software Silos. *Education Week*. 34.6 (Oct. 2014) s6-s7.
- [3] Clow, D. 2012. The Learning Analytics Cycle: Closing the Loop Effectively. In *Proceedings of the 2nd International Conference on Learning Analytics and Knowledge*. 134-138.
- [4] Clow, D. 2014. Data Wranglers: Human interpreters to help close the feedback loop. In *Proceedings of the 4th International Conference on Learning Analytics and Knowledge*. 49-53.
- [5] Goodman, D. P. and Hambleton, R. K. 2004. Student Test Score Reports and Interpretive Guides: Review of Current Practices and Suggestions for Future Research. *Applied Measurement in Education* 17.2 (2004): 145-220.
- [6] Wise, A. F. 2014. Designing Pedagogical Interventions to Support Student Use of Learning Analytics. In *Proceedings of the 4th International Conference on Learning Analytics and Knowledge*. 203-211.
- [7] Zickuhr, R and Smith, A. 2013. *Home Broadband 2013*. Pew Research Center. Washington, D.C.