

IPI Research Summary A: IPI Data and Student Achievement on High Stakes Tests

For schools to impact learning, students need to attend school, attend class, and, just as importantly, engage in learning while in class. That's stating the obvious. Just as obvious is the fact that when classroom learning experiences are realistically challenging and relevant, students are most likely to be engaged (Yair, 2000). Scholars tell us that engagement and student motivation are intertwined; almost a symbiotic relationship (see Hattie, 2009 and Cornelius-White/Harbaugh, 2010 for summaries of the research about this powerful relationship). Meaningful engagement influences motivation to learn and as motivation to learn increases, so too does the curiosity and capacity to learn. There is no mystery to this. Through logical reasoning, practical experiences, and empirical evidence, this relationship has been understood for years. This summary provides insight about specific forms of student engagement that are most directly related to student achievement. These findings are critical because they expand our understanding of how to increase engagement and indirectly influence student motivation.

The findings from this section are primarily from the research conducted by Justin Collins and Jerry Valentine from 2008 through 2010. The data represent engagement data collected using the IPI between 1996 and 2008. The data from the Collins/Valentine and Valentine/Collins papers were analyzed using two-level and three-level Hierarchical Linear Modeling and Structural Equation Modeling methodology. Some of the findings were first reported in Collins' Ph.D. thesis at the University of Missouri in May of 2009. Additional analyses provided other findings that addressed questions beyond the Collins dissertation study. Those were reported at research-oriented national/international conferences in numerous peer-reviewed research papers and at numerous professional conventions attended primarily by teachers and administrators. The sources listed at the end of each finding can be cross-referenced with the list of References at the end of the section. Copies of the papers cited can be obtained on the IPI website or from Professor Emeritus Valentine at ValentineJ@missouri.edu.

Finding A.1. Significant relationships exist between the degree to which students are engaged in higher-order/deeper learning experiences across a school and the student achievement scores on high-stakes accountability assessments in the content areas of Communication Arts and Mathematics.

Discussion/Implications:

Findings across several IPI analyses are consistent. As school-wide, student engagement in higher-order/deeper learning (IPI Categories 5 and 6) increases, school-wide student achievement as measured by student pass rates on high stakes tests in Communication Arts and Mathematics also increase. Throughout our research, the data generally predict a 2-3% pass rate increase associated with a 15-20% increase in HO/D engagement over a two or three year timeframe. Such a difference is substantial and in some instances the findings are more pronounced. For example, increases in high stakes pass rates of 6% in Communication Arts and 7% in Mathematics have been attributed to a 20% increase in HO/Deeper engagement.

These findings are congruent with reports from other research reporting increased achievement when students are asked to think more reflectively, analytically, critically, and creatively during the course of their learning experiences. Understanding of the content is generally deeper and with that depth of understanding comes the capacity to remember and deduce correct responses even on predominately recall-oriented high stakes tests. The achievement findings vary slightly by grade levels, with the greatest impact from HO/D engagement at the high school level and slightly lesser, yet significant, impact at the middle school and elementary levels.

The unique contribution from the IPI research is that the data are "school-wide" levels of engagement in HO/D computed against "school-wide" achievement levels on high-stakes tests. For years educational scholars have noted the influence of HO/D thinking on achievement in studies of individual students and their respective achievement and individual classrooms and their achievement. The IPI was designed as a school improvement process with data collection across the school for whole-faculty study

and adaptation based upon the school-wide data. The process does not identify data by teacher or by class. As schools progress in their collective understanding of the school-wide data, then subgroup data such as grade level data in an elementary school and/or content area data in a middle or high school can also be studied from the larger school-wide data set. In most IPI schools, the analyses of the disaggregated data support grade or content specific discussions that can be as powerful as the whole-faculty discussions. Our findings affirm that when schools periodically (three and four times a year) use whole-faculty and/or sub-group disaggregated methods of data study, engagement in higher-order/deeper learning experiences increase as a whole for the school and the resultant impact on school-wide student achievement is positive and strong. Obviously, the greatest value is the enhanced capacity of the students to think, to learn how to learn, and to appreciate learning. The secondary value is the increase in student pass rates on high-stakes tests.

Primary Sources: (a) (b) (c) (e) (f) (g) (h) (i)

Finding A.2. Significant relationships exist between the degree to which students are disengaged from learning during class time throughout the school and the student achievement scores on high-stakes accountability assessments in the content areas of Communication Arts and Mathematics

Discussion/Implications:

Not surprisingly, the strongest findings from the IPI research on engagement are found in the analyses of disengagement (IPI Category 1) and student achievement in Communication Arts and Mathematics. From the original analyses of this issue in the Collins dissertation to subsequent analyses by Valentine and Collins reported in numerous reviewed papers, the inverse relationship between disengagement and achievement has been strong. As school-wide disengagement in learning goes up, school-wide achievement on high stakes tests go down. Not only have the analyses been consistently significant, the ratios of the relationships have also been consistent. The pattern, stated succinctly, has been that for every 2% increase in student disengagement, student achievement has decreased approximately 1%. With such a powerful ratio, it is imperative that schools study, monitor, and address consistently their percentages of disengagement.

Two reminders about the “positive approach” used by IPI process for collecting engagement data are important at this time. First, the engagement code is based on how the majority of students in the class are engaged. Obviously, some students could be disengaged and that would not appear in the data code if the majority of students are otherwise engaged. Second, and very importantly, in the IPI process data are not collected during the first five or last five minutes of the class in all grade levels, and data are not collected during shifts from one content area to another in elementary schools. Both data collection protocols are used to create an optimum picture of engagement that will be viewed as fair and accurate by teachers, who must be willing to collectively and collaboratively study the data and learn from the data. Therefore, the IPI data which were studied in these analyses are more positive than is commonplace in other studies of engagement (for example, see the Yaer, 2000 study as a comparison). In other words, time taken to settle the students into the learning experience, or time given to “wind down” the learning and shift to the passing time or next class are ignored in the IPI process. The type of engagement common to those “first five minutes, last five minutes, and minutes for transitions” that are not coded in the IPI process are generally forms of codes of Category 4 (Teacher Directed Instruction) and Category I (Student Disengagement from the Curriculum). Even with the absence of such data (meaning the “first five, last five, and transitions”), the evidence of the relationship between disengagement and achievement is overwhelming. The presence of disengagement from learning during the expected prime learning time is devastating to students, both to their achievement on high stakes tests and more importantly to their general education and capacity to become a self-learner.

While it has not yet been an avenue of IPI empirical research, anecdotal observational evidence confirms a long-held adage about classroom learning culture. In classrooms, and schools as well, where disengagement is common day after day and class after class, a strong message is conveyed to students and the community that devalues the importance of education. Such a message has a profound effect on the learner’s perspective about the worth of education and learning. School faculty must monitor disengagement as a school-wide variable and the faculty must also study such data and consciously move

toward the reduction and subsequent elimination of disengagement data across the school. The “heart of classroom learning time” that the IPI measures must be productive learning time if students are to achieve optimum levels of academic success and an appreciation for the value of education and learning. The unseen and unimagined damage when learning time is not valued and students are not consistently engaged in learning undoubtedly cuts deep into the fabric of the community served by the school. When a school’s IPI Category 1 data are 10%, 20% and more, as is the case in some schools, the evidence is clear that the focus on learning has been lost and the school is doing a major disservice to the students and community it serves. The implications go beyond the school and into the community. Graduates and drop-outs leave the school ill-prepared to enter the workforce or continue their formal education. The local economy suffers and the attitudes of the community toward the educational system decline. This precipitates lack of support for the school which means lost resources and greater challenges to escape from the negative spiral of failure. The implications for disengagement data are obvious; schools must study their levels of disengagement and develop school-wide, sub-group, and individual strategies to address the issue. The presence of significant amounts of disengagement during learning time is paramount to educational malpractice.

Primary Sources: (a) (b) (c) (e) (f) (g) (h) (l)

Finding A.3 Significant differences exist in the nature of student engagement between schools that are considered highly successful academically and schools that are considered very unsuccessful academically.

Discussion/Implications:

In 2004, IPI data from two sets of middle-level schools (middle schools) were compared. Data from one set were collected as part of a national study of highly successful middle-level schools (Valentine, et. al. 2004). The schools studied were exceptional in all aspects, from programs and practices to student achievement. These schools were clearly a set of “high-flyer,” outlier schools compared to the typical middle-level schools of our nation. The second set of schools were clearly struggling schools, with achievement data in the bottom 5% the middle-level schools in the state. Though samples sizes in this study were small, the tests of differences for each of the six IPI Categories and selected combinations of categories provided no major surprises. The significance level of .05 was used as the standard for the tests of difference. It is interesting to note that two factors just missed the .05 level and were significant at the .10 level.

Not surprisingly, the tests of differences for IPI categories 5 and 6 (total HO/D engagement) were significantly higher in schools with histories of high achievement than in schools with histories of low achievement. Likewise, the test of differences for IPI Categories 4, 5, and 6 in combination were also statistically higher in schools with histories of high achievement. Conversely, the presence of Categories 1, 2, and 3 in combination was less frequent in the schools with histories of high achievement. The presence of Category 5 was significantly higher in the schools with histories of high achievement, while the analysis for Category 6 was also higher but only at the .10 level of significance. In the higher achieving schools, the presence of Category 3 was statistically lower, as was the presence of Categories 1 and 2 in combination. The presence of categories 4 and 3 in combination were also lower in the higher achieving schools, but statistically at the .10 level, not the .05 level. Interestingly, the differences for categories 6 and 2 were not statistically significant, even at the .10 level. Subsequent studies of the relationships between achievement and those categories would document those relationships as statistically significant in the expected directions (e.g. the studies described in Findings A1 and A2 above).

The findings from this small outlier study must be processed with caution. Obviously, higher levels of engagement are linked with greater achievement and higher levels of disengagement are linked with lesser achievement. One of the more interesting findings from this study was that the combination of categories 3 and 4 for this small set of outlier schools differed very little across the two sets of schools. IPI Categories 3 and 4 commonly represent 60-70%, or more, of engaged learning time regardless of the school’s grade level, academic success, or community affluence/poverty level. Both Categories 3 and 4 can accurately be described as “replete with passive learning experiences.” Category 4 represents teacher dominated learning experiences with students not engaged in HO/D learning and often engaged passively

in listening and/or responding to the teacher's explanations, knowledge, and directives. In Category 3 students are commonly engaged in some form of seatwork that is often physically and mentally passive and is absent HO/D thinking. While the percentages in these two groups of outlier schools were similar, anecdotal evidence (observations of the classroom engagement) leads to an understanding that a Category 4 in a high achieving school often looks different than a Category 4 in a low achieving school, yet it is still a Category 4. In other words, anecdotally we have noted that in higher-achieving schools teacher-led instruction is richer with relevant information and explanations, students are attentive at higher rates, and the images and understandings of the content created in the minds of the learners are deeper than is the case in lower achieving schools.

From a purely descriptive statistical perspective, the average percents of each category in the two groups of outlier schools were as one would generally expect. In other words, the average percents for Categories 6, 5, and 4 were higher in the higher achieving schools and the average percents of Categories 1, 2, and 3 were lower. Clearly, categories 5 and 6 are to be valued, categories 1 and 2 are to be avoided, and categories 3 and 4 are necessary components of learning found in all schools. However, educators should be cautious about the high presence of Categories 3 and 4 at the sake of Categories 5 and 6.
Primary Sources: (g) (h) (i) (n)

References:

- (a) Valentine, J. and Collins, J. (2011). *Student Engagement and Achievement on High-Stakes Tests: A HLM Analysis across 68 Middle Schools*. American Educational Research Association, Annual Conference, New Orleans, LA, April 11, 2011.
- (b) Collins, J. and Valentine, J. (2011). *The Instructional Practices Inventory in Rural Settings: Testing the Student Engagement-Standardized Test Performance Relationship*, American Educational Research Association, Annual Conference, New Orleans, LA, April 10, 2011.
- (c) Collins, J. and Valentine, J. (2010). *Testing the Impact of Student Engagement on Standardized Achievement: An Empirical Study of the Influence of Classroom Engagement on Test Scores across School Type*. University Council of Educational Administration, Annual Convention, New Orleans, LA, October 30, 2010.
- (d) Valentine, J. (2009). *The Instructional Practices Inventory: Using a Student Learning Assessment to Foster Organizational Learning*. National Staff Development Council, Annual Convention, St. Louis, MO, December 8, 2009.
- (e) Valentine, J. and Collins, J. (2009). *Analyzing the Relationships among the Instructional Practices Inventory, School Climate and Culture, and Organizational Leadership*. American Educational Research Association, Annual Meeting, San Diego, CA, April 14, 2009.
- (f) Collins, J. and Valentine, J. (2008). *A Study of Student Engagement and Achievement at the School and District Levels*. University Council for Educational Administration Annual Conference, Orlando, FL, November 1, 2008.

Conference Presentations

- (g) Valentine, J. (2010). *Student Engagement Does Make a Difference in Student Achievement*. National Middle School Association, Annual Convention. Baltimore, MD. November 4, 2010.
- (h) Valentine, J. (2010). *Establishing a Faculty-wide Collaborative Study of Student Engagement*, National Association of Secondary School Principals, Annual Conference, San Diego, CA. March 14, 2010.
- (i) Valentine, J. and Collins, J. (2009). *Improving Instruction by Profiling Student Engaged Learning and Creating Collaborative Teacher Learning Conversations*. National Association of Secondary School Principals, Annual Conference, San Diego, CA, March 1, 2009.

Other Documents

- (j) Cornelius-White, J. and Harbaugh, A. (2010). *Learner-Centered Instruction: Building Relationships for Student Success*. Thousand Oaks, CA: SAGE Publications, Inc.
- (k) Hattie, J. (2009). *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Student Achievement*. New York, NY: Routledge Press
- (l) Valentine, J. (2005). *Statistical Differences for the Percentages of Student Engagement as Measured by IPI Categories between Very Successful and Very Unsuccessful Middle Schools*. University of Missouri, Columbia, MO: Middle Level Leadership Center.
- (m) Yair, G. (2000). *Not just about time: Instructional Practices and Productive Time in School*. *Educational Administration Quarterly*, 36(4), 485-512.
- (n) Valentine, J., Clark, D., Hackmann, D., and Petzko, V. (2004). *A National Study of Leadership in Middle Level Schools, Volume II: Leadership for Highly Successful Middle Level Schools*. Reston, VA: National Association of Secondary School Principals.