Implementation of the Instructional Practices Inventory – Technology Process with Fidelity: The Impact on Technology Use and Student Cognitive Engagement

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Abstract: A small rural high school committed to becoming a high-tech school. However, data collected using the IPI-T process suggested teachers were typically the users of the technology, students were often disengaged, and teachers were asking students to participate in lower-order surface activities. Missing from the process was the implementation of the faculty collaborative sessions. One year after the initial rollout of the devices, faculty collaborative sessions were planned and facilitated within one week of collection data. Teachers (a) became familiar with the IPI-T Rubric and Protocols, (b) analyzed and discussed the data, (c) identified high-quality examples of student learning that foster student engagement with technology, (d) designed high-quality lessons that foster student engagement with technology, (e) compared longitudinal data and set goals for future data collection using the IPI-T tool. An analysis of the data revealed when implementing the IPI-T process with fidelity teacher and student technology use increased as did student cognitive engagement when using technology. In addition, it was found that students use technology for information searches the majority of the time rather than media development or to collaborate among peers for example, which are associated with higher-levels of cognitive engagement.

Keywords*:* Educational technology, Student cognitive engagement, Instructional Practices Inventory-Technology, Technology integration

Introduction

In an effort to provide access to technology and prepare students for the "digital complexities of the future", school board members in a small, rural community in Southern Iowa approved the purchase of Chromebooks to be distributed within the local high school. The school board and administration was interested in determining if students were using the devices as well as if they were cognitively engaged when using technology. As a result, they sent the researcher and a team of teachers to a workshop to be trained in the Instructional Practices Inventory – Technology (IPI-T) process.

According to Valentine (2017), "When IPI/IPI-T data are collected for the purposes of school improvement, all teachers should have the opportunity to study the data and reflect upon their perceptions of effective learning/instructions" (p. 3). Faculty should converse about best practices and the value of the six categories. Once a baseline is established, discussions about how to change the engagement profiles over time should occur to ensure instructional design and teaching practices evolve. The first data collection profile should serve as baseline data and future data collections provide longitudinal perspectives of engaged learning for the school. Valentine (2017) recommends each school collect data four times each school year to achieve optimum impact. Teacher leaders collecting the data should engage faculty in studying the data to identify patterns, trends, and changes in each data profile as well as establish and deliver purposeful professional development and continuous conversations.

Rationale for Studying Student Engagement

For many years, cognitive psychologists studying cognitive engagement have noted "that as students get older and progress through the K-12 learning experience, the pattern of focus during learning time declines (as cited by Valentine, 2013, p. 2). Valentine (2013) reported, "In our IPI data, this is evidenced by the lower average percentages of disengagement during elementary school (2-3%) followed by higher percentages in middle schools (3-4%) and the highest percentages in comprehensive high schools (6-8%)" (p. 2). Not surprising when considering today's students are different from generations before them (McCrindle, 2014; Prensky, 2005; Schrum & Levin, 2015; Tapscott, 2009).

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Technology's influence on brain development of today's students implies the need to make thoughtful and informed decisions about the engagement of learners and changing instruction to meet the needs of today's learners (Autry & Berge, 2011; Milman, 2009; Prensky, 2001a, Tapscott, 2009). Many of today's students, particularly as they progress to high school, appear to be disengaged, unmotivated, and uninterested in learning (Prensky, 2001a; Prensky, 2005; Schrum & Levin, 2015). Shernoff, Csikszentmihalyi, Schneider, and Shernoff (2003) reported over a quarter of the day, secondary students are in a disconnected state, such as boredom (as cited by Jensen, 2016). In an effort to align current teaching practices with the integration of technology and reach today's students, the IPI and IPI-T process assists in the collection of data to get an insight into how students are engaging in the learning during the instructional activity.

Purpose of the Study

The purpose of this explanatory-sequential mixed method study was to assess the impact of the IPI-T process on technology use and student cognitive engagement. The goal was to implement all strategies, including faculty collaborative sessions four times per year to support teacher implementation of new technology to increase higher-order, deeper thinking by students and increase student use of technology.

Research Questions

1. To what extent does participation in faculty collaborative study sessions affect faculty's technology use as measured by codes on the Instructional Practices Inventory Technology (IPI-T)?
2. To what extent does participation in faculty collaborative study sessions affect student's technology use as measured by codes on the Instructional Practices Inventory-Technology (IPI-T)?
3. How do faculty view their participation in faculty collaborative study sessions? Specifically, did participating affect the teacher's use of technology use in the classroom?
4. How do faculty view their participation in faculty collaborative study sessions? Specifically, did participating affect students' use of technology use in the classroom?

Method

The design employed was an explanatory-sequential mixed methods approach. The quantitative portion of this study used the IPI-T instrument, a pre-determined and numerically coded instrument, to collect data concerning the frequency and scale of student cognitive engagement as technology is integrated into the classroom (Larinee, 2003; Valentine, 2015). Observational data collected using the IPI-T was recorded numerically for analysis and interpretation through descriptive and inferential statistics (Valentine, 2015). A web-based questionnaire, created by the researcher, was used to collect qualitative data. The questionnaire consisted of both closed-ended and open-ended questions. Data collected from the qualitative strand was analyzed for themes and then because the data was collected in sequence, findings were associated with the quantitative results of the IPI-T to determine how and why the data converged.

Participants

The research participants are employed within a school district located in southern, rural Iowa. The district includes five buildings: (a) preschool; (b) kindergarten and first grade; (c) second through fifth grade; (d) the middle school which houses students in grades six through eight; (e) the high school, grades nine through twelve. This research study involved only the high school, grades 9-12 because technology is nearly one device per two students.

Quantitative

A convenience sampling strategy was employed for the quantitative strand of the study. The quantitative method was a quasi-experimental within-subjects approach utilizing a pretest and posttest design. Participants included 27 faculty members, 11 males and 16 females. Each participated in faculty collaborative study sessions within

one week from the collection of data using the IPI-T Recorder App. statistics were used to analyze the nominal data and main effects of participation in faculty collaborative sessions, particularly the effect on IPI-T student cognitive engagement codes using the parametric statistic of analysis of variance (ANOVA).

Qualitative

The sampling strategy for the qualitative strand was a purposeful sample, utilizing a confirming and disconfirming sampling procedure during the study to follow up on and explore specific findings (Creswell, 2015). A single person from each content area, listed on the IPI/IPI-T Data Recording Form, was identified and invited to volunteer to participate in an open-ended, web-based questionnaire. Content areas included core classes: math, science, social studies, and English and language arts, as well as non-core classes: fine and performing arts, physical education and health, vocational technology, and special education.

Results and Discussion

An examination of the data revealed that participation in faculty collaborative study sessions had a statistically significant impact on student technology use as well as student cognitive engagement when using technology. While teacher technology use did increase, the expected impact of participating in faculty collaborative study sessions was that teachers' technology use would actually decrease. Descriptive statistics revealed more often students participate in information searches and word processing when they are the users of technology which are associated with lower-order/surface thinking. Furthermore, results showed that 31% of the codes collected, higher-order/deeper thinking was observed when students were the user of technology. Technology use categories observed at a higher level included media development, collaboration among individuals, and experience-based technology.

For the qualitative portion, data were thematically analyzed and interpreted looking for overlapping themes within the open-ended questions, with the goal of providing a greater understanding of the quantitative results and the impact the faculty collaborative study sessions had on technology use and student cognitive engagement. Four key themes emerged: (a) technology integration, (b) implementing new technology, (c) awareness of tech usage, and (d) more time. Of the four themes that emerged from the questionnaire responses, the greatest overlap was regarding awareness. In line with first order-external barriers, all eight of the participants mentioned that more time is necessary. Specifically, participants stated that they need more time to study and analyze the IPI-T data as well as to participate in purposeful professional development.

Conclusion

Findings from this mixed methods study confirm that implementing the entire IPI-T process with fidelity has been shown to have a positive influence on student technology use and student cognitive engagement. School board members in the targeted district have already purchased $250,000 worth of Chromebooks and have committed to additional purchases in the upcoming school year. As they move toward a 1:1 environment, longitudinal data can be studied and the IPI-T process can drive collaborative discussions among teachers and leaders to ensure a successful adoption of technology.

Recommendations

Future research should extend these findings by replicating this study with faculty from the same school district in different grade levels or with the same faculty, grades 9-12, to gather longitudinal data. Findings from future research, examining the impact of participating in faculty collaborative study sessions at multiple grade levels, could be used to inform district initiatives, school improvement, and the development of professional development to integrate technology. The IPI and IPI-T encourages faculty members to work towards a balance of higher and lower levels of student cognitive engagement through incremental changes in instructional practice (Dennis, 2013). Additionally, future studies should include an examination of the change in technology instructional practices when faculty participate in faculty collaborative study sessions over a period of time.

References

Autry, Alex J., Jr, & Berge, Z. (2011). Digital natives and digital immigrants: Getting to know each other. *Industrial and Commercial Training, 43*(7), 460-466. doi:10.1108/00197851111171890

Creswell, J. W. (2015). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (5th ed.). Lincoln, NE: Pearson.

Dennis, L. B. (2013). How Are Teachers Integrating Technology in K-5 Classrooms? Studying Student Cognitive Engagement Using the Instructional Practices Inventory-Technology (IPI-T) Instrument. New Mexico State University, Las Cruces, New Mexico.

Jensen, E. (2016). *Poor students, rich teaching: Mindsets for change*. Indiana: Solution Tree Press.

Larinee, D. B. (2013). *How are teachers integrating technology in K-5 classrooms: Studying student cognitive engagement using the Instructional Practices Inventory-Technology (IPI-T) instrument.* (Unpublished doctoral dissertation). New Mexico University, New Mexico.

McCrindle, M. (2014). *The ABC of XYZ: Understanding the global generations.* Australia: A McCrindle Publication.

Milman, N. B. (2009). Are students today really different? *Distance Learning, 6*(2), 59-61. Retrieved from http://search.proquest.com.ezproxylocal.library.nova.edu/docview/230703086?accountid=6579

Prensky, M. (2001). Digital Natives, Digital Immigrants, part I. *On the Horizon, 9*(5), 1-6. Retrieved from http://old.ektf.hu/~kbert/2014_15_01/erasmus/DigitalNativesPartIII.pdf

Prensky, M. (2005). Teaching digital natives: Partnering for real learning. Retrieved from http://marcprensky.com/wp-content/uploads/2013/04/Prensky-TEACHING_DIGITAL_NATIVES-Introduction1.pdf

Schrum, L. & Levin, B. (2015). *Evidence-based strategies for leading 21st century schools*. California: Corwin.

Tapscott, D. (2009). *Growing up digital: How the Net Generation is changing our world.* New York: McGraw Hill.

Valentine, J. (2013). Frequently requested facts and figures about student engagement. Unpublished manuscript.

Valentine, J. (2015). The Instructional Practices Inventory- Technology (IPI-T): IPI-Technology Component Workshop description. Unpublished manuscript.

Valentine, J. (2017). The IPI Process-Basic perspectives. Unpublished manuscript.