Investigating Deeper Learning

Amie Potter, John Hendron, and Andrea Burton present at Apple, Inc. in December 2018.

Executive Summary
Prepared January 3, 2019
Action Research in Goochland County Public Schools

Apple Research Initiative

After being invited in December 2017 to come to California to embark on a research project at Goochland Middle School, we collaborated with other Apple Distinguished Schools to research a problem of interest in our schools. Helping us were Dr. Damien Bebell and Dr. Ruben Puenteudura, two experienced education researchers. In December 2018 we returned to California and presented our research findings.

Our mission was to research how we could improve our approach toward bringing deeper learning to our classrooms. Specifically, our research question was “is there a measurable impact that instructional coaching has on the evidence of deeper learning in social studies classrooms?” Our findings indicated that there was a measurable impact from coaching, but that there are multiple reasons for why lessons don’t continue along a consistent trajectory of growth in depth.

Goals

The purpose of this document is to report our findings and provide deeper understanding of our methods. The research protocol itself may be of interest to practitioners, but the ultimate goals at conducting this research in schools include:

• a better understanding of how to plan and design for deeper learning experiences for students by education stakeholders,

• to increase building leader skill at recognizing and evaluating deeper learning activities,

• helping to improve the instructional coach’s skill at collaborating and planning with classroom teachers,
• to develop reflective practitioners who can better address shortcomings in practice, including coaching, collaborating, instructional planning, and instructional delivery.

We’d like to thank the social studies department at Goochland Middle School, chaired by Mr. Glenn Hecker, for being gracious hosts from January 2018–December 2018, having us visit their classrooms, to help them design lessons, and survey students.

I would also like to acknowledge the hard work and organization of Ms. Andrea Burton, instructional technology coach at Goochland Middle School, for agreeing to play a major role in this study. This project’s success belongs both to her and her colleagues at GMS.

Lastly, we’d like to thank Ms. Jennifer Rucker, former principal of Goochland Middle School, and Ms. Amie Potter, interim principal at Goochland Middle School for their participation and attendance at the Apple Research events.

– John Hendron, Ed.D.,
Director of Innovation & Strategy

Some lessons planned by our social studies teachers took learning outside the classroom. Students in Matt Singleton’s class used the media center to facilitate a simulation of immigration to the United States.
Research Methods

Protocol

We used the following protocol for our study. The study was designed to be administered by a three-person team: lead researcher, building administrator, and the instructional technology coach. In our initial study, we chose to work with an entire department and we approached this idea with the social studies department in January 2018.

- **Observation of four lessons over time.** We chose to focus on two lessons per semester (18 weeks). Observations are done by the research lead and building principal in tandem using the Pathways instrument.

- **Collaboration with the technology coach.** The 2nd-4th lessons are co-planned with the technology coach. The coach brings a different lens of experience to support planning and lesson execution. We used the Apple *Elements of Learning* digital book to provide a scaffold for professional development for our teachers.

- **Pre-screening with teachers.** Before the coach meets with teachers, a pre-screening survey is administered by the coach to the teacher, collecting their thoughts about the lesson they plan to deliver. This may be given to teachers ahead of all four lessons even though the first lesson is planned alone by the teacher. This data aligns with our observation instrument.

- **Post-Learning student survey is delivered.** A student survey instrument captures the student experience during the lesson. The survey is either delivered to students at the conclusion of the lesson or project, or the next class period.

- **Data are processed.** Both survey data and observation data are processed to generate individual depth scores. Researchers can negotiate to share results with teachers during the study or after the study is completed, but we did not share any data until the study is complete. We recommend this so that observations do not feel evaluative. Researcher notes should be kept with each observation and by the
teacher and technology coach so that the data share is more valuable when undertaken.

• **Reflection.** Each step is ripe for reflection by all practitioners. Keeping notes will help in this pursuit.

**Instruments**

Several years ago we created an observation instrument that uses multiple facets or “pathways” related to learning. We used the theoretical frameworks of William Rankin (cubic learning), Ruben Puentedura (modification of SAMR), Norman Webb (Depth of Knowledge), and Kereluik and Mishra (synthesis of twenty-first century skills). Our pathways instrument is nothing more than a way for us to document where the observed learning lies along each one of these frameworks. We then use a mathematical transformation of these ratings to compute a “depth score.” This score allows us to track the quality of learning, as observed, over time.

We also created a teacher pre-planning survey and a set of student surveys.

**The Six Pathways and Three Domains**

We have organized six pathways into three domains of learning: knowledge, means, and resources.

**Knowledge Domain.** For this domain, we combine the content and depth of knowledge pathways which together represent roughly a third of our “depth of learning” or instructional depth score. “Content” describes how students interact with the subject matter or knowledge. Is it simply passed to them, is it discovered, or is it created through experiences?

Webb’s Depth of Knowledge is a re-interpretation of Bloom’s Taxonomy. This echoes the cognitive processing students have with content. It wouldn’t be surprising to see the scores for these two pathways in synchronization.
### Means Domain

How is knowledge acquired? We call this means. Means is both context and the application of skills. As students experience high levels of authenticity with context, we’d likely assume too that they are utilizing a rich collection of twenty-first century skills.

<table>
<thead>
<tr>
<th>Content</th>
<th>1 - delivered</th>
<th>2 - directed</th>
<th>3 - discovered</th>
<th>4 - created</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>information is being <em>delivered</em> to students by a talking teacher, a video presentation, or by reading material provided by the instructor</td>
<td>content is acquired through activities that are heavily scripted with some input or choice made available to the learner; a scaffold may be used</td>
<td>knowledge is derived from a cognitive event, such as inquiry, deduction, or through activities that satisfy a student’s natural desire or questioning</td>
<td>the learning activities involve the creation of knowledge in the domain of the content area</td>
</tr>
</tbody>
</table>

Describe the observed content interaction scenario:

<table>
<thead>
<tr>
<th>Depth of Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DOK 1:</strong> Recall and Reproduction</td>
</tr>
<tr>
<td>simple procedures and recall of facts; remembering</td>
</tr>
</tbody>
</table>

What will students need to do to succeed at the task?
Resources Domain. Our peers and our tools are both powerful resources for learning. As social animals, we many times thrive as learners when we are connected to prior knowledge and one another, especially so when we are working toward creating knowledge through collaborative experiences. Digital tools help extend our capacity and can be used to amplify learning experiences. In our model for resources, we emphasize the social aspect of learning over the technical.
## Community

<table>
<thead>
<tr>
<th>1 - isolated</th>
<th>2 - connected</th>
<th>3 - collaborative</th>
<th>4 - consolidated</th>
</tr>
</thead>
<tbody>
<tr>
<td>the learner is participating with content in a solitary way</td>
<td>learning begins to be social; the interaction however isn't working together toward common goals</td>
<td>socialized learning where there is a healthy balance of contribution from multiple learners</td>
<td>instead of learners working together as a collection of individuals, the team functions well as a highly productive team; team members may have specialty skills that help contribute to the team's success; experts may be involved</td>
</tr>
</tbody>
</table>

Describe how students are working together or alone:

## Integration of Tools/Technology

<table>
<thead>
<tr>
<th>1 - no technology</th>
<th>2 - efficiency</th>
<th>3 - enhancement</th>
<th>4 - transform</th>
</tr>
</thead>
<tbody>
<tr>
<td>specialized technology or tools do not have a role in the learning activities</td>
<td>technology is affording the learner and also possibly the teacher an efficiency in the learning process (easier, faster, or combination of the two)</td>
<td>hardware or software contribute to the depth of experience; technology affords capabilities that add value (individualization, facilitating collaboration, promoting advanced skills)</td>
<td>the tool affords a level of learning that would be impossible without the tool; i.e. observing cells without a microscope, interviewing native speakers in Spain with Skype, etc.</td>
</tr>
</tbody>
</table>

What are students doing using technology?

## For Further Reading

The following resources were consulted in the construction of this model. The primary source is the Cubic Learning model by William Rankin.


Students participating in a Push-Pull Factors lesson in Glenn Hecker’s class used both their 1:1 iPads and MacBook Air laptops to create a map that captured the journey of an assigned persona.
Findings

1. Use of the Pathways observation instrument and student surveys resulted in a measure of growth of deeper learning after the initial, baseline lesson with all teachers.

2. Across several lessons, student survey results mirrored the observations conducted in the classroom. In one case, student perceptions of depth were appreciably higher than what was observed by evaluators.

3. In an open-ended survey question, most of the 320 student responses were easily coded into several categories. Students were asked to postulate the purpose for their learning in the observed lesson or project. Deeper learning-aligned responses included “learning for future jobs,” (third) “skills needed outside of school (later life)” (first), and “learning changed my mind about a topic” (fifth). Responses not as closely aligned with deeper learning included “lesson will help prepare me for a future lesson at school” (second), “lesson will help prepare me to teach this to someone else” (sixth), and “I’m unsure of why I learned this lesson” (fourth). Five of the six responses were very promising in acknowledging student engagement with learning.

4. Reflection from the technology coach provided insight for the growth of evidence for deeper learning not following a linear trend (e.g., the final observed lesson wasn’t necessarily the ‘best’ in terms of deeper learning). Time for planning, amount of planning, and participation in the lesson were cited as areas for improvement for using collaboration and coaching for having students experience deeper learning.

5. Lessons observed in this study covered a number of promising instructional practices for supporting deeper learning. Students engaged in meaningful collaboration, media production, creativity, and problem solving. The use of
simulations helped engage students and were designed to help them better understand concepts such as human migration.

6. Future use of the methods with deeper learning research will entertain coach and teacher reflection at the conclusion of lessons to strengthen understanding of the deeper learning model.

7. Reactions to some of the lessons captured with photographs and video received very enthusiastic praise from observers in California, made up of Apple staff and other participating Apple Distinguished Schools.

Because of the nature of this study, we will not disclose here individual observation or student survey results. Results will be shared individually with the participating teachers. We will disclose both the depth scores as computed and the ratings for each lesson along each of the six pathways.

We plan to augment our methods based on discussion with participating teachers.

Reflection

The Pathways instrument is not “scientific.” It is a theoretical mechanism to “peel the onion of learning” in different ways. The individual depth scores mean nothing in themselves. However, by using the same instrument over time, the depth scores can show general “growth” or “regression” in depth of learning using the identified pathways. With a focus by the teacher and the coach on some common goals (deeper learning), our expectation might be that we’d see more “deeper learning” over time.
In the end, a high “depth score” does not equate to a “better teacher.” Some topics and units of study are designed to be learned with lower cognitive levels—what educators might describe as “surface level learning.” Not every topic in the curriculum is congruent with a high-depth design for learning. That is why we thought it was important to ask teachers about their goals before the collaboration began. In the end, a teacher who successfully matches learning to their goals for students is the mark of an excellent teacher.

Finally, not all lessons are “project based learning” by design. We believe that PBL is a robust way to address goals for deeper learning, but our teachers use a variety of approaches and the lessons we observed in our initial study were not all long-term projects. It may be helpful in the future to denote lessons that are “short term” lessons versus those that take multiple class meetings, considered “projects.” The instruments used naturally should favor higher depth scores for PBL. When decoding depth scores over a period of time, it’s worth noting that a rise or fall in depth score isn’t only attributable to the quality of coaching and collaboration; some lessons may be deliberately designed to offer less “depth of learning.”

The Augmented Reality Sandbox, created by the Modern Smarts Club at GMS, was used in one collaborative lesson as an introduction to GIS and topography in World Geography.
About Goochland Middle School and the Study of Deeper Learning

Twice, Goochland Middle School has been recognized as an Apple Distinguished School. The iPad Deeper Learning initiative began in Goochland County in the fall of 2013 at Goochland Elementary School and today we have an established 1:1 program in grades K-12.

Goochland Middle School has also been recognized in 2016 as a National School to Watch by the Virginia Department of Education.

Over 630 students attend GMS in grades 6-8 and the school employees 64 teachers and school counselors. Our study was planned in December 2017 and was conducted from January 2018 through December 2018 with guidance from Dr. Mark Benno, Apple; Dr. Ruben Puentedura, research consultant, and Mr. Stuart Ralston, co-author of Apple's *Elements of Learning* book which uses the Stanford Research Institute’s five elements toward deeper learning.

In December 2018 Ms. Amie Potter is interim principal of Goochland Middle School and formerly was assistant principal at the school. Ms. Andrea Burton has been the instructional technology coach at GMS since August 2017. Dr. John Hendron has supervised instructional technology in Goochland County since July 2001.

Participating teachers from our social studies team include: Mr. Glenn Hecker, Mr. James Frago, Mr. Matt Singleton, and Mr. Sean Singleton. We applaud them for their energy, openness to new things, and commitment to professional growth.

gms.goochlandschools.org