Cogs & Considerations for Learning Environment Design in the 21st Century

Report from a Learning Environment Design workshop held at the University of Pennsylvania’s Graduate School of Education with regards to Philadelphia area public and charter high schools

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Introduction

In April 2013, the Leaders in Education Advocacy & Reform Network (LEARN) hosted a workshop at the University of Pennsylvania that brought together individuals in the field of education to discuss the future of learning environment design with regards to Philadelphia area public and charter schools*. Looking primarily through the lens of the high school level, and focusing on the implementation of new technologies into these learning environments, the group discussed 4 primary areas of learning environment design: Technology Implementation into the Classroom, Digital Learning Environments, Flipping the Classroom, and Physical Design & Aesthetics.

The 4 discussion topics were split up into stations - referred to as Pods - in the Penn Graduate School of Education building. The participants (which will be referred to in this report as the LED team) engaged in practice and discussion that resulted in several Cogs** (ideas and recommendations regarding learning environment design) and Considerations (questions regarding learning environment design). The following report lists all of the cogs and considerations that were developed in each pod, with an explanation of the discussions that surrounded them.

Purpose

This report is to serve as a potential resource for educators, educational leaders, and administrators as technology becomes more included in the everyday classroom. This report is not meant to serve as the authoritative voice on the matter of learning environment design; rather, it is to serve as a contribution to the conversation and perhaps even a starting point for those who plan to further explore this area.

*This report is made with regards to Philadelphia public and charter schools because the participants drew from their various experiences working in educational and learning institutions in Philadelphia. It is our hope, however, that this report will be a helpful resource for anyone anywhere who is concerned with designing effective learning environments using today’s technology (especially for high school students/teenagers).

** Why Cogs? Cogs are the teeth on gears that allow for them to interact with each other to create motion. The LED team gathered together with the hope that their ideas together could create motion towards a stronger emphasis on effective and creative learning environment design in education.
Pod A: Technology Implementation into the Classroom

Context: The exponential growth of technology over the past 20 years has changed the educational landscape, creating more ways to teach and learn than ever before. Educators now have many options for implementing technology into the classroom. Methods of implementation can potentially influence classroom culture and students’ learning experiences. Therefore, the way that technology is implemented into the classroom is a critical topic when discussing learning environment design.

Method:
1) The LED team began the workshop with an extensive open discussion on technology practice and implementation into the classroom.

- **Cog 1: Educational leaders should consider further exploring the complexities of technology.**

The LED team recommended a renewed focus on acknowledging and exploring the complexities of technology. The concern is that we as educators and educational leaders have implemented technology at a hurried speed in order to keep up with technological innovation in the larger society. This rushed speed increases the likelihood that we have vastly underestimated the complex nature of the technology itself and the consequences of its use in an educational space. This, in turn, limits our understanding of the possibilities of the technology in that space and could stunt our ability to use that technology to most effectively enhance the learning experience.

In addition to this, the team proposed a greater focus on the technology that exists for educational use beyond a computer, tablet, or smartphone. In this case, the team is referring to the grand definition of educational technology:


Anything in the classroom that adds to the resourcefulness of that room is a piece of technology that could contribute (or detract, if used unwisely) from the learning environment. It is possible that some of the technology that we have used for decades - but have perhaps taken for granted - could be used in different ways to add to the learning experience for the students.
• **Cog 2:** *Educational leaders should try to foster a school environment and culture that allows for creativity and innovation.*

The LED team found it important for educational leaders to foster a school environment that allows for creative and innovative ways of teaching and learning. To cultivate creativity and innovation, the team proposed a decreased focus on standardized test scores. In our current academic environment, educators may have to “teach to the test,” which can hamper creativity outside of the established curriculum. A decreased emphasis on the results of these tests would allow educators more flexibility to experiment with new methods of teaching and learning. Specifically, teachers could explore different ways of using technology to achieve measurable learning goals.

Further, a school climate and culture that champions creativity and innovation could foster a classroom culture that encourages learners and educators to tinker with technology in new, exciting ways.

• **Cog 3:** *Increase the focus on differentiated instruction.*

Our team believed that differentiated instruction could be beneficial due to the possibility that each student may learn differently on each piece of technology. This brings forth the possibility that not every student will learn as effectively as others who are using the same technological resource. For instance, while one student may perform exceptionally well using a tablet for learning science, another student may learn best by using physical lab materials or reading textbooks. Still, another student may learn best through simulation. In this example, to make the whole class use a tablet to learn science may put certain students at a disadvantage.

The LED team recommended that each piece of technology that is implemented into the classroom should be thoroughly examined and explored in its own right in regards to learning (refer to Pod A, Cog 1). Further, the team recommended that educators examine students’ learning styles and attempt to implement technologies that support these styles.
• **Consideration 1: Does the technology match the learning objective?**

Much like a student would use a calculator while working on math problems, different forms of new technologies may align best with different learning objectives. Are we using the technology that best helps students reach specific learning objectives? For example: teachers might be tasked with helping students develop critical thinking skills. If the students use technology in a passive way (such as skimming text on a website), then this may not encourage those critical thinking skills. Therefore, to help students meet the intended learning objective (critical thinking, in this case), the educators could implement creative, interactive technological applications into the classroom such as coding or video game design programs.

• **Consideration 2: What problem is the technology solving?**

To further extend on **Pod A, Consideration 1**, the group expressed concern that technology is being implemented at times for the sake of implementation. What problem is each piece of technology solving? Can this problem be solved without the use of new technologies? Are we simply creating problems to justify the use of technology?

If we can clearly define the problem that any piece of technology is solving, this may lend itself to the greatest degree of learning from that technology. Also, having this firm understanding of the most effective way to use the technology could help us to design learning environments that facilitate this.

• **Consideration 3: Regarding what technology is implemented: How much flexibility should be given to individual teachers and students?**

The LED team discussed—and largely rejected—the idea of standardizing the technological experience in the classroom. Instead, our team favored the idea of teachers and students having the flexibility to use the technologies that actually work for their learning objectives. Standardizing technology increases the possibility that students would end up using resources that do not work for their specific learning objectives.

However, is there some level of standardization that would be helpful? On one end, standardization could hamper teachers who have grown accustomed to their own ways of implementing technology. On the other end, a minimal level of standardization could possibly help minimize some of the confusion on exactly what to do with the new technologies. Is a balance possible?
• **Consideration 4: What role should policymakers have in the conversation?**

Even though the team supported student and teacher flexibility with technology use, the team decided that some type of relationship between policymakers and the schools regarding technology practice in the classroom would be beneficial. Because technology is becoming increasingly important in the lives of the students that attend these schools, policymakers may benefit from learning about the technology needs of students and teachers in a meaningful, first-hand manner.

**With Teachers:**

Policy Makers Establish Relationship with Teachers → Teachers communicate the successes and failures of technology in their classroom → Policymakers can make informed decisions to advocate for what the teachers need in the classroom

**With Students:**

Policy Makers Establish Relationship with Students → Students inform how they use technology in their lives in and out of school and what technology means to them → Policymakers can make decisions that support teachers’ ability to use technology to connect in meaningful ways with the students

This means that policymakers may benefit from attempting to understand the motivations behind technology use by the students (by talking directly to the students), and from listening to reasons why certain teachers love technology while others do not like (or even trust) technology.
Pod B: Digital Learning Environments (Virtual Worlds & Video Games)

Context: Digital learning environments have become increasingly common resources in and out of the classroom. Such environments include online and massive open online courses (MOOCS), virtual worlds, video games, and participatory media. The design of these particular digital learning environments, and the design of the physical learning environment around its use, becomes a critical factor in keeping the learner engaged.

Method:
1) The LED team watched as some of the members who were less familiar with the game Angry Birds learned how to play (on the Google Chrome internet browser) entirely based on the design of the game and by trial and error.
2) The team then watched a video regarding Conspiracy Code, an educational virtual world that teaches U.S history.
3) The team had a general discussion on video games, virtual worlds, and learning.

- Cog 1: Solicit input from multiple stakeholders (teachers, students, principals, etc.) as to what games are selected for educational use and how they’re used.

The LED team agreed that decisions made on what types of educational games are used in the classroom should include input from those most affected by these games - the students and the teachers. Educational leaders who are not familiar with the daily occurrences of the modern classroom may make game choices that fail to mesh with the needs of the students in those classrooms. As teenagers are major users of video games and virtual worlds such as World of Warcraft, their voices are important in determining what types of games would be useful for their own learning. As noted by games researcher James Paul Gee:

“IT IS THE CONNECTIONS OR ASSOCIATIONS THAT PEOPLE MAKE AMONG THEIR EXPERIENCES THAT ARE CRUCIAL TO LEARNING, THINKING, AND PROBLEM SOLVING,”
(Gee 2007, p.71-72).

Further, the teachers are most familiar with the students, and thus, may have the best idea of what digital learning environments could mesh well with their students’ learning styles and personalities (refer to Pod A, Cog 3).

- Cog 2: Apply reward systems from games to other contexts.

After examining the learning possibilities in Angry Birds, the team discussed taking some of the reward methods found in games and transferring them to physical learning environments. Some
Researchers have called for this using the term, *gamification* (Deterding et al., 2011, p.9). The team focused particularly on two principles:

First, well-designed video games are exceptional at giving instant feedback to the player to help that player learn what are the right (or wrong) moves and actions. In *Angry Birds*, the explosion of the pigs when the birds hit them, along with the rewarding of points, taught the players from our LED team to keep hitting the pigs with the birds. Having to replay the level if all of the pigs were not eliminated reinforced that the goal of each level was to find a way to eliminate all of the pigs. These “lessons” were taught through instant feedback from the game design. Designing the physical or blended learning environment in a way where feedback can be given in instantaneous ways like this can possibly serve as an advantage if done strategically.

How *Angry Birds* uses the digital environment to teach the player:

Second, well-designed video games are also exceptional at empowering players just enough to get past a level (i.e. giving them a new power or ability that will help them clear the next challenge). As the players from our LED team progressed to further levels in *Angry Birds*, they were rewarded with new types of birds with special abilities needed to clear the level. Designing the physical learning environment in this way, so that students are “leveling up” to make it through the next lesson, can possibly help make the learning experience engaging, fun, and challenging.

- **Cog 3: Increase the use of open learning environments – allowing students to choose what games to play and create with help from facilitators.**

The LED team was supportive of open learning environments that allow students to have more control of what types of games they play and, in turn, what types of learning experiences they have. Intel’s *Computer Clubhouse* and also the popular game *Minecraft* are two open world environments that facilitate creativity, exploration, and expression for players. Giving students the opportunity to explore these types of worlds and engage in significant self-exploration opens the door for a deeper, more meaningful learning experience for the student.
• **Cog 4: Stress the importance of the teacher.**

The team agreed that while there is a lot of potential in video games and virtual worlds as learning tools, the most important element when using these tools for learning is still the teacher. The students’ learning experience in the game will be affected by the learning environment the teacher has implemented around the game, and the way the teacher infuses that game into the lesson plan. If the teacher does not consider these elements carefully, the game has a chance to teach the students, but the opportunity for a significant learning experience may be lost.

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• **Consideration 1: How can we assess learning, particularly when students are playing (and have played) a variety of games?**

If we are using video games for learning, what is the best way to subsequently assess that learning? This matter becomes further complex when considering the variety of educational games available. Should each category of game have its own standards?

• **Consideration 2: What role specifically should the teacher play when using video games and virtual worlds as learning tools?**

As discussed in Pod B, Cog 4, the LED team believes that the video game is maximized as a learning tool if the teacher puts critical thought into how to implement that game into the classroom to create a meaningful learning experience. But what role should a teacher take to accomplish this? For instance, in Conspiracy Code, the teacher is a major character and resource within the actual virtual world. Should the teacher be a participant in the game/virtual world with the students, or should the teacher take a more passive role?
Pod C: Flipping the Classroom

Context: One pedagogical strategy that is becoming increasingly popular thanks to the rise of technology and access to information is “flipping the classroom,” which involves having the students teach themselves the lessons at home primarily through video lectures and using class time to “work through problems, advance concepts, and engage in collaborative learning” (Tucker, 2012, p.82). This approach presents both challenges and opportunities for modern-day teachers.

Method:
1) The LED team watched 2 videos of teachers explaining the flipped classroom model and listing the benefits of the model.
2) The team had a general discussion about the strategy of flipping the classroom.

- **Cog 1:** In the classroom portion of the flipped classroom models, students should be grouped by more than just proficiencies.

The LED team recommended approaching the classroom portion of the flipped classroom strategy with flexibility regarding groupings (if groupings are used). In one video that the team watched, the teacher explained that by flipping the classroom, she could now group the students by proficiency during the classroom portion of learning. The team, while supportive of the method of flipping the classroom, expressed concerns about the possible ramifications of grouping by proficiency (such as students in the “lower” proficiency group feeling inferior to those in a “higher” proficiency group). The team recommended that teachers also consider other qualifiers to divide the classroom such as learning interests or career goals.

- **Cog 2:** Create differentiated instructional resources for classroom use to help with proficiency.

The team recognized that the implementation of the flipped classroom strategy allows more time for the teacher to help students with their academic struggles in a personalized manner. The team suggested taking this approach and infusing it into the classroom whether the flipped model is used or not. For example, the teacher could create Frequently Asked Questions (FAQ) sheets or bring in resources that could be instantly available for students if they are struggling with a lesson. This would require the teachers to get to know the proficiencies of their students in a way where they can select and design the resources ahead of time (and subsequently map out the implementation of these resources).
• **Cog 3: Facilitate the ability to get instant feedback while watching videos.**

The flipped classroom strategy can rely heavily on the use of video for online lectures and lessons. The team acknowledged that the ability to understand these videos becomes critical to the learning process. A student may get confused while watching a video; this stunts his or her understanding of the lesson and puts that student at a disadvantage the next day in class. With no teacher in instant reach for help, students would be best served with some type of feedback/help system to help them understand the videos and online lectures when needed. Some examples include a FAQ web page regarding the videos, encouraging the students to call each other or connect on social media should they have difficulties, and creating an ongoing wiki that the students can access and modify during the afterschool hours based on the video lessons.

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• **Consideration 1: Is the technology (computers, internet connection, DVD players, etc.) actually accessible to the students and if not, how can schools help?**

The flipped classroom relies on students engaging in self-directed learning outside of school hours. What happens if students do not have access to the technology needed for this at home, such as laptops, smart phones, or a DVD player? On another level, what if some students have access to more advanced, faster technology than others? Does this create an unfair advantage? How can schools help with these potential problems?

An example of this:

**Student with high-speed internet at home:**

Student has access to high-speed broadband internet at home → Student can watch online videos quickly, and access the rest of the web for help quickly → Student may have higher likelihood to come into class beyond prepared

**Student with lower-speed internet at home:**

Student has lower-speed internet at home → It takes more time to download and watch the video, and also access to the rest of the web takes a lot of time → Student may not be as prepared as the student that has the high-speed internet at home, thus may be behind by comparison
Consideration 2: How can teachers make sure that the students actually watch the videos and engage in the lessons at home?

Since teachers using the flipped classroom model are relying on the students to self-direct their learning after school hours, what are the best ways to make sure those students are motivated to watch the videos and engage in the lessons? What role should parents play? Should students be tasked to hold each other accountable through social media, text messaging, and other popular forms of communication?

• Consideration 3: How can educators group students effectively within the classroom portion of this model?

What other ways besides proficiency can we organize the classroom to foster collaboration, creativity, and positive esteem? We have listed learning interests and career goals (refer to Pod C, Cog 1) but what are some other ways?
Pod D: Physical Design & Aesthetics

Context: An important factor in the learning experience for the student is the physical learning environment itself. Advances in technology have opened the door for innovative classroom and open-space models. Educators must consider several factors, including flexibility and availability of resources, when designing such models.

Method:
1) Each member of the LED team drew a sketch of their ideal classroom learning environment.
2) The team shared these drawings with each other and discussed the thoughts they had during the design process.
3) The team had a general discussion regarding physical learning environment design.

- Cog 1: Design with flexibility and reinvention in mind so that the classroom set-up can accommodate different methods of teaching and learning.

Rather than maintaining one setup for most or all of the year, the LED team recommended that teachers should be prepared to use multiple classroom designs to accommodate different methods of teaching and learning.

One way to help with this is to put furniture in the classrooms that can be moved around easily, such as chairs and tables with wheels attached (or sliders for a lower cost option). The team also discussed using dividers to section the room in various ways. An example would be to use the dividers to cover certain technology in a classroom when it’s not in use, or to block a section of the classroom that will be reserved for the use of technologies like white boards and laptops. Sectioning these areas off can help keep students from being distracted when these technologies are not in use.

- Cog 2: Let students have a voice in the setup of the classroom.

The team discussed how rare it is for students to get asked how they would like the classroom to be arranged. An initial conversation with the students to gain their input on how the class should be designed may bring forth a sense of ownership for the students and motivate learning. Also, the students themselves may know best what learning environment designs will help them to learn or in some cases, which designs would prevent them from learning (refer to the citation from James Gee in Pod B, Cog 1).
Possibilities of allowing student input on class design:

- **Consideration 1:** Will the classroom inspire students to meet objectives in a creative way, preparing them for the 21st Century Workplace?

  The 21st Century workplace is increasingly asking for more creativity, adaptability, and flexibility from its workers. Does the physical learning environment in the classroom or learning space foster these skills for students?

- **Consideration 2:** How can teachers obtain the resources they need when they need them?

  What are the best ways to support teachers receiving the physical resources that their classroom needs for student learning, creativity, flexibility and innovation without them having to pay for these things on their own? (refer to Pod A, Consideration 4).
CONCLUDING THOUGHTS

Technology has changed the landscape of teaching and learning at a frenetic pace in the past 20 years. Because of this, it is important that we examine the design of the learning environments where we are implementing this technology. By doing so, we are giving ourselves a chance to create a learning space that optimizes the effect of various forms of new technologies.

The LED team expressed positive curiosity regarding the future of learning environment design and how changes in technology will affect this. There was an acknowledgement that there are many questions to ask and consider regarding learning environment design, and a one-day workshop could only begin the discussion. Further, while this report was made with regards to Philadelphia public and charter high schools, further work must be done in order to create specific strategies that can be used on a widespread scale in schools throughout the city. However, the LED team is confident that now is the time to seriously consider this issue of learning environment design, and that by doing so, educators and educational leaders will have the capability to further enhance the learning experience for students of all ages.
References


Tucker, B. (2012). The flipped classroom. Education Next, 12(1), 82-83

Resources

In our workshop we used the following resources:


We also used Angry Birds, originally developed in 2009 by Rovio Entertainment (Espoo, Finland), on the Google Chrome internet browser.

Images from Clker.com, under public domain as of date of publication.

Cog illustrations with text by Alison Perch. Flowcharts by Marcus T. Wright.
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