

Our 7th Grade “Blended” Experience: The Power of Individualized Learning with Technology

Ricky Tang

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School and Teaching Context

My school is located on the South Side in the Armor Square community area. It is in the Chinatown area and it has been at the current address for more than 120 years. Restaurants and grocery stores make up the majority of the nearby businesses and there are also a post office, a public library, and a fire station that are close to our school. The Chinese-American Museum of Chicago and a couple of historic Chinese-American church buildings are also part of our neighborhood. In addition, we have a few parks that are within walking distance. The area is in a relatively safe environment, with infrequent crimes that are mostly robberies and thefts.

Our current school building is about 20 years old. It is three stories high, with a basement for storage and plumbing/mechanical fixtures. The first floor consists of the school and administrators’ offices, the faculty lounge, the lunchroom that attaches to a partitioned multi-purpose room with a stage, and four classrooms that house arts, pre-kindergarteners, and kindergarteners. The second floor has the gymnasium, the library, two resource rooms, and twelve classrooms for first to fourth graders. The third floor has the technology lab, the music lab, one resource room, and twelve classrooms for fifth to eighth graders.

Even though my school is a neighborhood school and Chicago Chinatown is more than a hundred years old, the student population, according to some of the veteran teachers, has gone through a shift from a European American majority, mainly of Italian descents, to an African American majority, and to a Chinese American majority now. According to Chicago Public School’s Website, last year, there were a total of 671 students enrolled at my school, and the largest demographic was Asian. This demographic made up 83.8% of the student population and the second greatest demographic was African America at 12.5% (see Figure 1). Among all students, 94% were low income Students, 5.1% were students with exceptional needs, and 29.5%



Figure 1: School student population—84% Asian, 13% African American, and 3% others

were Limited English Learners. Adding to the mix of neighborhood children, our school also accepts, through lottery and when space is available, students living outside the attendance boundary because of the school’s magnet cluster status. Though, priority is given to students who already have a sibling enrolled in the school.

The teaching staff at our school consists of half Asian American, a quarter African American, and the rest European American. They have varying teaching experience from first year to 30+ years, and several of them are National Board Certified Teachers. Our students, despite of their socioeconomic disadvantage, perform well in standardized tests. For instance, in 2012, 90% of our students met or exceeded their grade levels in ISAT reading, math, and science; in 2013, 70% of them outperformed norms in math and 57% in reading. Moreover, in general, our school

does not have much discipline issues. As Ms. M¹, one of the substitute teachers who frequently come to our school, describes, “If I had students who were like those here, I wouldn’t have retired.” (Teacher Journal, February 12, 2014).

I started to teach at my school five years ago. Besides being the Technology teacher for all students from kindergarten to eighth grade, I am also the Technology Coordinator for the school. I generally have the same teaching load as any other regular teacher in my school. This year, we have five teaching periods, one preparation period, and a duty-free lunch time. As part of the ancillary staff, I see students in 10-week blocks. That means I teach technology to the same group of classes for a quarter everyday, then another group of classes the next quarter, and so forth. By the end of the school year, I would have taught technology to most of the classes at my school. Due to the mismatched number of classes and number of ancillary subjects, there are some classes I won’t be schedule to teach directly. However, I always try to reach out to or make myself available to teachers so we can collaborate on supporting the technology aspect of their curriculum.

I was hired by a principal who retired two years later. Then there was an interim principal who took care of the school while the Local School Council searched for a new principal. The current principal at our school has been with us for the second year. All three principals were very supportive of my teaching and work in terms of integrating technology into my lessons and using technology by other teachers. Last summer, a couple of teachers and I were involved in a design program to pilot blended learning in their classrooms to meet the needs for all students. We were awarded a grant to implement our innovation to address differentiation using technology. My principal and assistant principal were able to move around resources and schedules so that I can be in these two teachers’ classrooms to co-teach and support technically when they have blended learning time. I also have three other classes throughout the day. I push in to a primary class in the morning and receive two intermediate/upper grade classes in the afternoon.

The blended learning classrooms are for math and science. Two seventh grade classes are mixed up and divided into four groups according to their subject pretests they did at the beginning of the school year. During blended time, which is twice per week for 90 minutes each, students work individually on math and science online activities that their teachers assigned to them based on their current academic level. The learning is self-paced and the activity sequence is self-selected. Students record and reflect on their learning every time they finish an activity. While students are working on their activities individually, teachers pull students out for small group intervention, re-teaching, or enriching. In addition, once per week, students work in pre-assigned small groups to work on solving a problem that overarches the science and math concepts and contents through a period of time. For example, in the first quarter, students worked on a problem to restore prairie to their local community. Using what they learned from environmental science and mathematics inquires, students had many options and choices to tackle and solve the design problem.

My morning class is with a primary classroom. I push in and teach students technology using mainly laptops. I try to balance the curriculum with skill-based assignments and creative lessons. In the afternoon, when I teach intermediate/upper grades, I focus on applying technology in

¹ All personal names in this paper are pseudonyms.

concept-based lessons, in which students integrate, collaborate, and share their ideas and knowledge through the use of technology. The Technology Lab is warm, and hot at times, with thirty-six desktop computers that are more than 8 years old.

Rationale for My Action Research

I have been teaching technology for the past few years. Most of the time, I ensure students are fluent with the use of computer and information literacy at their age/grade level. Occasionally, I will have an opportunity to work with teachers in supporting domain subject learning with technology. Last school year and summer, I worked with a science teacher and a math teacher to develop a flexible blended learning model for an interdisciplinary unit for seventh grade students. I am very interested in finding out how the current and emerging technology used in that model helps students learn. If the model works for our seventh grade students, how could we scale it to support other subjects and groups of students?

This flexible blended learning model has two parts. The first part is individualized, differentiated learning for science contents and math skills. The second part is an interdisciplinary problem-based project that is intended to provide a context and purpose for students to integrate and apply what they learn during the first part of this model to solve an authentic real-world challenge.

Students engage in the first part of the model (“blended time”) two times per week for 90 minutes each and the second part one time toward the end of the week (“project time”). During blended time, students check out a device (laptop, iPad, Chromebook, or desktop) and work through a list of online activities that are pre-selected by their teachers. These activities are provided by various Web sites such as LearnZillion, Khan Academy, and BrainPOP (see Figure 2). Since students can choose which activities to start first, I wonder if students have a preference either on platform (i.e., which Web sites) or topic.

Figure 2: Students work individually on a device during Blended Time

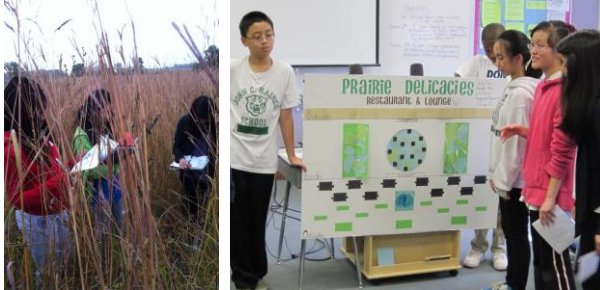


Students also complete a Personalized Learning Plan (PLN) with their teachers to set goals for their learning. This plan helps students document their learning path since they write a reflection in their plan after they finish each activity. I wonder if there is some sort of characteristics to how students choose their activities sequence and pacing, and if these characteristics evolve over time.

Through the first quarter, students use the knowledge they constructed and skills developed to tackle a problem during the project time: creating a plan to restore prairie to their community. They brainstorm ideas, learn about various options, setup parameters and criteria, contact community organization and members, and pitch their plan to their class (see Figure 3). Together with the blended time, I wonder what mastery level students can achieve with this learning model. What about knowledge transfer and retention?

In addition, we try to “sell” this learning model to students as much as we can. We emphasize that the blended time is a special time for them to really engage learning at their own level. We

Figure 3: Restoring Prairie fieldtrip and group presentation



also describe the project time as an important component for them to put what they learn into real world application. I wonder if the students “buy” what we try to sell. Would the novel effect wear out? If so, how and when? I also wonder if students really experience differentiation in the activities that we put together for their learning needs. How do students view differentiation for them over time?

Lastly, the learning platforms that we provide for the students have many enrichment opportunities. Students have access to a broad set of topics in great depth of the two disciplines (science and math). As students get familiar with the learning model, I wonder whether they will start to access topics that they are curious about or interested in, and, subsequently, lead to development of own learning and go beyond what was on the activity lists that teachers put together for them.

Literature Review

When educator Harry Wong addressed teachers and principals at a national conference, he admitted that he is “the biggest burglar” in the education field (Hopkins, 2000). He believed that effective teachers “borrow and steal” good teaching techniques to help students achieve. Through the years, since technology has become part of our lives, educators have been “borrowing” and “stealing” technology to use in their classrooms for teaching—from overhead projectors to televisions and from desktop computers to handheld tablets.

I wasn’t a huge television fan when I was little; however, I felt in love with my Apple II personal computer during my adolescent years. At the same time, it wasn’t the vast variety of games that drew me into the system, even though I did spend endless hours on them. Rather, I was so intrigued by the whole paradigm that I could actually program a machine to do what I wanted it to do, save my commands, and have the computer to do it over again when I needed it to.

This is similar to the educational technology that I have been using for the past few years. I create lessons on the computer, share them with my students, and update the lessons every year based on the progress of the students. The nature of my lessons has changed over the years also, as different programs have become available. I used to teach more skill-based lessons around computer technology like keyboarding and hardware maintenance but now I teach subject contents using various online tools. This year, I am collaborating with two other teachers and piloting a learning model that uses technology to individualize learning for our students. This model is called Blended Learning.

Blended Learning Introduction

Technology has been used inside and outside of the classroom for teaching and learning in many ways. Blended learning is a formalized model that provides individualized learning for students using a combination of face-to-face and technology-based learning in a planned, systematic way (Lieser & Taff, 2013). The amount of technology used and time for students to spend with the technology depends on the implementation of the blended learning model. Project Tomorrow (2011) highlights blended learning as one of the key trends that “[has] generated significant interest this past year at conferences, in policy discussions and within our schools and districts (p. 3).” According to Project Tomorrow, compared to 2008 figures, in 2010, nearly 40 percent more school administrators and five times as many parents would include online classes into their vision for their school. They understood that online and blended learning empowers student ownership of their learning through personalization of the learning process and collaboration with peers and experts. Lieser & Taff (2013) also find their blended curriculum not only provides their students with access and flexibility to learn through a different modality, but also changes the way learning occurs through an enhanced learning environment supplemented by online materials.

Moreover, Liu (2013) describes how the blended learning environment encompasses not only the content of the instructional subject, but also material presentation, assignment submission and feedback, student involvement, and teacher reflection. These facets of blended learning, as argued by Liu, have helped increase interactions within learning communities, reduce communication anxiety, motivate students to become autonomous learners, and enhance student academic performances. In the following sections, I will look into several aspects of blended learning that are related to my action research.

Self Selected Learning Path

One aspect of blended learning that I am interested in is how learners choose their learning path. The blended learning model that I am implementing provides my students with a certain degree of freedom and flexibility in terms of the order to complete a set of activities for mastering a concept (or multiple, related concepts). However, students are not encouraged to venture off the activity list to craft their own learning path with other materials until they have finished all the given activities.

According to Al Zumor, Al Refaai, Eddin, & Al-Rahman (2013), blended learning provides an environment to deploy various learning strategies, including meta-cognitive strategies, for students. At the same time, Ting & Chao (2013) find that high performance students benefit from self-regulating learning strategies more than other students. My students document their choices when they select which activity to do and reflect on the learning outcome of the activity. When I interview my students, I can prompt them to talk about how they have chosen their sequence of activities and see whether they use systematic strategies. I also want to look at if different performance groups have different strategies.

Engagement/Motivation

Another aspect of blended learning that I am interested in is whether it deepens learning engagement and increases motivation in learning. Sucaromana (2013) finds that students who are taught in a blended learning environment have higher levels of intrinsic motivation, a better attitude toward the learning subject, and even better satisfaction with the learning climate than a face-to-face only environment. Thang, Mustaffa, Wong, Noor, Mahmud, Latif, et al. (2013) suggest that the blended learning model benefits students in terms of meeting their personal learning needs.

However, motivation in learning is always complex and hard to predict, and blended learning has the same fate. Bolliger & Erichsen (2013) argue that personality can affect how learners perceive blended learning. Using an abbreviated version of the Myers-Briggs Type Indicator (MBTI) inventory with the four dichotomous scales of personality (Extraversion–Introversion, Sensing–Intuition, Thinking–Feeling, and Judging–Perceiving) and an online student satisfaction survey, Bolliger & Erichsen find that extravert and intuitive learners rank blended learning lower than online learning over their introvert and sensing counterparts. At the same time, Ocaik & Akçayır (2013) talk about how to use “motivational tactics” as external conditions in blended learning to improve overall learner motivation and achievement. These tactics are based on the ARCS model that focuses on attention, relevance, confidence, and satisfaction of instruction (p. 1059).

Hence, blended learning and motivation can be a complex issue. On one hand, blended learning can increase student motivation in learning when compared to a traditional face-to-face environment; on the other hand, a student’s personality can affect her or his learning preference with technology. Moreover, additional “tactics” can be injected into the learning environment to motivate students to learn. Therefore, designing a blended learning model that helps learners to achieve would not only require an extensive set of quality learning materials and an effective delivering mechanism, but also a thorough understanding of who the learners are.

Learning Outcomes

The goal for using different instructional strategies is the same: student learning. With the range of diverse learners in my classroom, it is always challenging to be able to reach each student and help all of them to succeed. I want to see whether putting in extra efforts for setting up and delivering instruction in a blended learning environment is really worth the resources (time and money).

Ionita & Asan (2013) compare learning outcomes between blended learning and traditional learning environments. They argue that the individualized internalization of learning contents in a blended learning environment represents “a more serious premise for the transfer of knowledge” beyond classroom to the real world (p. 254). This refers to the notion that when learning is differentiated at the individual level, students are constructing knowledge that they believe will be useful beyond classroom and applicable in their future professions. However, Chen, Jones, & Moreland (2013) find that blended learning has a less favorable outcome as compared to traditional learning in advanced courses. They believe that it is due to the lack of face-to-face contact in online delivery of instructions during blended learning. Based on

transactional distance theory, which describes how physical separation between the teacher and the learner can lead to psychological and communication gap, Chen et. al. argues that the increased levels of cognitive processing needed in advanced courses could lead to “different perceived learning outcomes [by students] depending on the mode of delivery of course content (p. 4)”. That means students would perceive a more variation in the quality of online delivery of instruction as courses increase in conceptual difficulty.

Students in my class write a reflection everyday after they finish their blended learning activities. Cross-referencing their learning outcomes, as measured by unit assessments, with their self-reporting learning difficulties can help me understand whether the blended learning model in my class is scaffolding enough for each student.

Research Question

My primary research question for my action research is:

What happens when students engage in self-paced, self-selected topics among a prescribed set of online activities to learn Science and Math?

To be specific, I want to know what is working for students and what the outcomes of their learning are when they engage in blended learning:

- What paths do students choose when they can select the order and pace to finish a set of learning activities?
- What materials are students covering and mastering from this blended learning experience?
- Does student engagement in learning change over time?
- What perception do students have in terms of meeting their individual learning needs with blended learning?

Data Collection Methods

1. Students complete their own learning plan daily when they have blended learning. They record the activities that they have worked on, what they have learned from those activities, and any questions they might still have. I have made a copy of all student learning plans up to before Spring Break. These are also graded by their subject teachers.

2. Time-on-task observations were done several times to record student engagement during blended time. Each observation is 30 minutes long and it targets on one student. Every 30 second, her or his action (or non-action) is noted on an observation log.

3. A survey on how students perceive whether their learning needs are being addressed had been administrated at the beginning of each quarter for the first 3 quarters and at the end of school year. These surveys can also show if students’ perceptions have changed during this school year.

4. Subject specific unit assessments are given to students to measure knowledge gained by them through blended learning. These measure the mastery of subject matters.

5. Student interviews on their learning experience with blended learning were conducted. Students talked about their learning plan, differentiation perception survey, and, if applicable, time-on-task observation in these interviews.

6. Finally, I wrote weekly journal entries about the blended learning lessons that I observed. These journal entries include my reflections on what I observed, as well as conversions and comments from students and teachers.

Data and Interpretation

Time on Task Observations

During blended time, students work on a daily list of activities that are assigned to them by their teachers. At the same time, their teachers work with individual students or a small group of students for remediation or enhancement (see Figure 4). One major concern that I have about this blended time is whether students can autonomously engage in their assigned activities without the need of constant monitoring by their teachers. The time-on-task observation logs provide me with an objective way to account for what students are doing. The following table summarizes the time-on-task data I collected:

Figure 4: Teacher works with individual students and small groups during blended time



Table 1: Time on Task Observation Results Summary

Student	Time on Task	Lesson Focus (Quarter Number)
Matthew	93%	Presentation creation for the Restoring Prairie project (Q1)
Roxanne	88%	Linear Equations on MathIsFun (Q3)
Julia	83%	Body System on BrainPOP (Q2)
Brandon	79%	Punnet Square on McGraw Hill Higher Education (Q3)
Lorenzo	76%	Proportional Relationship on LearnZillion (Q2)
Heidi	72%	Equivalent Ratio on BrainGenie (Q1)

Each time-on-task observation session was a half-hour long. I chose one student randomly per session and noted whether she or he was on task every 30 seconds. Thus, I collected 60 data points per log. Six of these logs (two per quarter) were done for this research. One of them is attached as an example (Appendix I). I analyzed these logs and found that, for those students I observed, on average, students are on task 82% of the time. This is quite encouraging since these students were working through a 90-minute session on their own without explicit teacher intervention with their learning. The highest on task percentage was as high as 93%.

There were, however, some students with a lower on task percentage. One student, Heidi, was on task about 72% of the time. Further analysis indicates that 11% of the time she was adjusting her earphones, 5% of the time playing with her wristband, and 6 % of the time doing other things

(fixing hair, looking over at group learning, and checking email). However, actions like adjusting earphones, playing with wristband, and even fixing hair, do not necessarily mean total disconnect from learning or engaging in mental processes. Hence, at the end of the quarter, I interviewed Heidi about her experience with blended learning. She said, “I like the blended learning time but there is so much to do. I try to finish as much as possible so I don't have to do it as homework.” She continued, even without me asking about her behaviors during blended time, “However, I get so tired after a while and I start to day dream. I got in trouble from being off task.” (Student Interview with Heidi, May 29, 2014).

Of course, at the same time, staring at the computer screen or typing notes do not mean full engagement in learning either. The student who was on task the most, Matthew, spent his off task time at the drinking fountain (7% of the time, about 2 minutes within the 30-minute time on task observation period). The rest of the time he was working on his Chromebook. When I asked him to describe his engagement with the work during that session, he said, “I was working on the [Restoring Prairie] project presentation and I had to finish my part. I was working on it with my group members in Prezi.” (Teacher Journal, October 23, 2014).

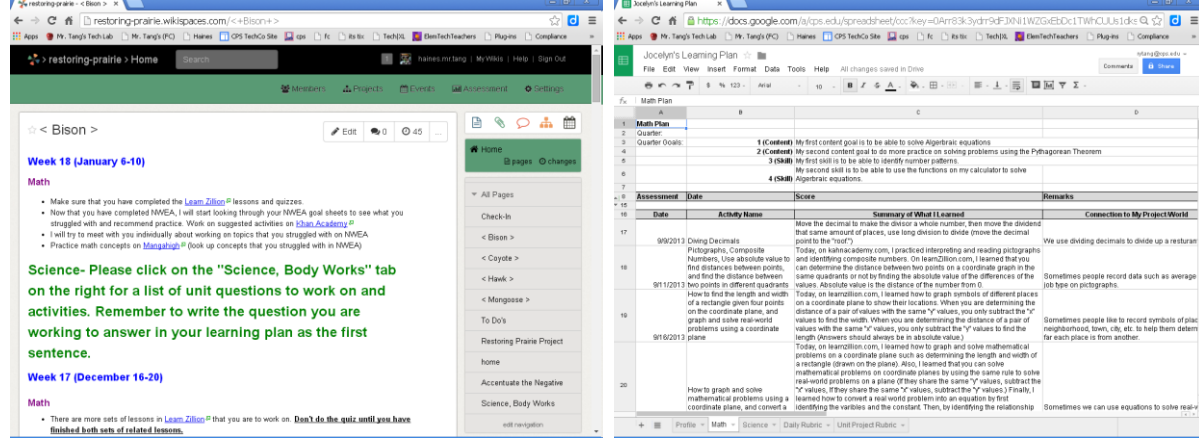
I realize that, based on the experiences by Heidi and Matthew with blended learning, the activities that students were working on during blended time could play a crucial role in student's sustained engagement with the learning activities. When Heidi was going through the “playlist” of online work, essentially acquiring new contents and practicing new skills, she got tired when she tried to finish all the work within the class period. Whereas, when Matthew was creating his presentation and collaborating with his group members online, he was fully engaged even though he also wanted to finish his work. This helps me to think about how to create playlists for blended learning. They should not be a simple list of similar tasks, but rather a combination of work that includes learning new contents and skills, creating something meaningful with prior knowledge, and encompassing a social aspect of learning like group work or online discussion. Moreover, work management habits could also be fostered with blended learning playlists. As suggested by Heidi during her interview, work during blended time should be “[broken] up into smaller chunks and put mandatory breaks in between.” (Student Interview with Heidi, May 29, 2014). If my collaborating teachers and I could find the most optimal times to insert mandatory or suggested breaks in playlists, students might be able to work more efficiently, effectively, and healthily during blended time.

Student Individual Learning Plans

Students access their online learning portal first during blended time. This portal is maintained by the subject teachers and they post learning activities weekly. Each learning activity can also be a playlist of lessons and other activities. When students finish an activity, they write a reflection on their learning plan. Every student who participates in blended learning has a personal individual learning plan (see Figure 5). It is essentially a spreadsheet document with several sheets: 1) student profile sheet, 2) math learning sheet, 3) science learning sheet, and 4) project rubric sheets. Student profile sheet contains information about the student including NWEA test scores and an About Me section that student describes themselves—their interests, preferred ways to learn, strengths and concerns. The math and science learning sheets of the learning plan allow students to set goals for their subject learning for each quarter and document

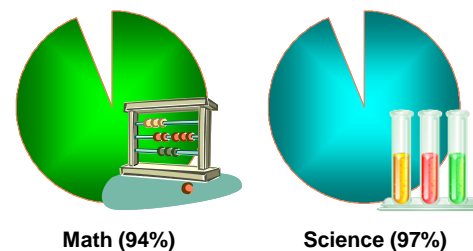
their daily learning activities. Project rubric sheets in the learning plan are for students' reference when they are working on their problem based integrated units. These student learning plans are private to the students and only shared individually with their teachers. See Appendix II for excerpts of a sample student learning plan.

Figure 5: Student online portal (left) and part of a student's personal individual learning plan (right)



I have collected a total of 52 student learning plans. Each of them has 33 math assignments and 32 science assignments in it. A closer examination shows that 12 of these 52 learning plans have incomplete assignments. Further analysis indicates that there are 101 missing or incomplete math assignments and 44 missing or incomplete science assignments. Although the numbers seem high initially, the actual incompleteness rates for math and science are only 6% and 3% respectively. Therefore, students were completing almost all activities that were assigned to them by their teachers (see Figure 6). This is very encouraging as students worked autonomously during blended time under minimal teacher supervision. As I reflect on the learning and behavior cultures among our students, blended learning is surely a model that would work for them—they like to finish their given assignments and are willing to engage in learning activities to accomplish that. So, when teachers are able to customize activity playlists, individual's learning needs can be met with this model at my school.

Figure 6: Completion rates of assignments during blended time



Moreover, I am interested in finding out how students choose the order of their learning activities and how they pace themselves along the way in a blended learning environment. These student individual learning plans can provide some answers for these questions.

Order of Learning Activities

As mentioned earlier, each week, teachers update the activity list in the student online learning portal that students are supposed to complete daily. Students can finish the activities in any order they deem appealing to them and, if students want, they can also go back and redo any

When I asked students about their strategy for choosing their next activity after they finished one, Jia Min said, "Since we are expected to finish all activities anyway, there is no point to work on them in any other order except linearly down the list." (Teacher Journal, November 22, 2013). This reminded me about how Heidi was venting to me about the amount of work that students had to do during blended time. On one hand, teachers wanted to provide enough activities for all students during the self-directed blended time; on the other hand, some students might feel overwhelmed by the amount of work that was assigned to them. The "choice" aspect of blended learning was not manifested in our model. Seeing that the order of activities chosen by our students was linear and almost the same for everyone, I wonder how we could provide enough mandatory activities for all students while encouraging students to take on additional enriching activities when they have extra time.

Pace of Learning Activities

As for the pace of working on the learning activities by students, there was an obvious range from "finishing all daily assigned activities in class" to "catching up until the middle of the night." (Teacher Journal, March 28, 2014). I sampled two days of blended learning activities during a week in March and looked at the times when students completed their reflections. Since all students shared their personal learning plans with me, I was able to check the contents as well as the last modified time of these plans. The following table summarizes the number of student learning plans that were completed at various times:

Table 3: Numbers of Students and the Times They Finished Their Monday and Wednesday Assignments

Accumulative Number of Students Who Finished Their Monday Learning Plans (out of a total of 52 students)		Monday (3/24/3014) Learning Plans Finished at:	Accumulative Number of Students Who Finished Their Wednesday Learning Plans (out of a total of 52 students)		Wednesday (3/26/3014) Learning Plans Finished at:
36		12:55 pm (class ends)	27		12:55 pm (class ends)
36		2:45 pm (school ends)	27		2:45 pm (school ends)
42		5:00 pm	31		5:00 pm
45		8:00 pm	35		8:00 pm
49		12:00 midnight (due time)	43		12:00 midnight (due time)
49		5:00 pm next day	48		5:00 pm next day
52		12:00 midnight next day	49		12:00 midnight next day

From Table 3, we can see that students finished their reflections at various times. A majority of students (49 on Monday and 43 on Wednesday) attempted to complete their assignments before the due time, which was by midnight of the day that the assignments were given. All students finished their Monday assignments before the next blended time, which was on Wednesday; though, three students still didn't finish their Wednesday assignments after two days. These various completion times of assignments by students indicates that the self-pace aspect of blended learning was manifested in our model. Students were able to access online learning activities after school and worked at their own pace. Nevertheless, I learned that deadlines and due dates were still important for students. They were ways for teachers to communicate with students about their expectations.

Content Quality of Learning Plans: A Comparative Case Study of Two Students

Since student individual learning plans have a vast amount of information about student learning and student self-reflection in them, I have chosen to examine two learning plans—one from a high performing student, Jocelyn, who averaged an A for both Math and Science during the first

three quarters and one from a struggling student, Richard, who averaged a D in Math and a borderline C/D in Science for the first three quarters—in details to look at their sequence, pace, and content quality.

Table 4: Math and Science Activities Sequences Comparison with Jocelyn’s and Richard’s Individual Learning Plans (Green = In Order; Red = Make up; Black = Missing/Skipped)

Math Activity Sequence	Jocelyn	Richard	Science Activity Sequence	Jocelyn	Richard
1 (Sept)	Green	Green	1 (Sept)	Green	Green
2	Green	Green	2	Green	Green
3	Green	Green	3	Green	Green
4	Green	Green	4	Green	Green
5	Green	Green	5	Green	Green
6	Green	Green	6	Green	Green
7	Green	Green	7 (Oct)	Green	Green
8 (Oct)	Green	Green	8	Green	Green
9	Green	Green	9	Green	Green
10	Green	Green	10	Green	Green
11	Green	Green	11 (Nov)	Green	Green
12 (Nov)	Green	Green	12	Green	Green
13	Green	Red	13	Green	Green
14	Green	Green	14	Green	Green
15	Green	Red	15	Green	Green
16	Green	Green	16	Green	Green
17	Green	Red	17 (Dec)	Green	Green
18 (Dec)	Green	Green	18	Green	Green
19	Green	Green	19	Green	Red
20	Green	Green	20 (Jan)	Green	Red
21 (Jan)	Green	Green	21	Green	Green
22	Green	Black	22 (Feb)	Green	Green
23 (Feb)	Green	Black	23	Green	Black
24	Green	Black	24	Green	Green
25	Green	Black	25	Green	Green
26	Green	Black	26	Green	Green
27	Green	Green	27 (Mar)	Green	Green
28	Green	Green	28	Green	Green
29 (Mar)	Green	Green	29	Green	Green
30	Green	Black	30	Green	Green
31	Green	Green	31 (Apr)	Green	Green
32	Green	Red	32	Green	Green
33 (Apr)	Green	Green			

Table 4 on the left shows that, besides Richard’s missing assignments and make-up work, both Jocelyn and Richard followed the sequence of activities listed in the online playlists linearly, consistently similar to the rest of the students during blended time.

Unfortunately, I didn’t capture the exact duration that Jocelyn and Richard spent on each assignment to calculate the pace they took for each lesson during blended time. Using the feedback that teachers gave Jocelyn and Richard, nonetheless, I was able to infer the approximate completion dates of their assignments. Jocelyn must have finished almost all of her math and science assignments before the due time, which was by midnight of the day that the assignments were given, because she was scoring full points for most of her assignments. There was only one exception for a science assignment in September that

she didn’t complete, according to the teacher’s feedback on her learning plan. Richard, on the other hand, was not able to finish a handful of his assignments before the due time as commented by both teachers in his learning plan. He even had a number of incomplete assignments that he never finished. When I asked him about his pace during an interview at the end of school year, Richard explained, “I like singing in my head. Sometimes that interferes with my learning.” (Student Interview with Richard, May 28, 2014).

Beside the difference in pace, there was also a discrepancy in content quality between Jocelyn’s and Richard’s individual learning plans. Moreover, this discrepancy was particularly evident at the beginning of the school year. Figure 7 below shows the two learning plans in September:

Figure 7: Jocelyn's (top) and Richard's (bottom) Individual Learning Plans in September

Microsoft Excel - 01 Jocelyn's Learning Plan					
A	B	C	D	E	
1	Date	Activity Name	Summary of What I Learned	Connection to My Project/World	Questions I Have
2	9/11/2013	Pictographs, Composite Numbers, Use absolute value to find distances between points, and find the distance between two points in different quadrants	Today, on kahnacadey.com, I practiced interpreting and reading pictographs and identifying composite numbers. On learnZillion.com, I learned that you can determine the distance between two points on a coordinate graph in the same quadrants or not by finding the absolute value of the differences of the values. Absolute value is the distance of the number from 0.	Sometimes people record data such as average salary per job type on pictographs.	What are some other types of information you can show on a pictograph?
3	9/16/2013	How to find the length and width of a rectangle given four points on the coordinate plane, and graph and solve real-world problems using a coordinate plane	Today, on learnzillion.com, I learned how to graph symbols of different places on a coordinate plane to show their locations. When you are determining the distance of a pair of values with the same "y" values, you only subtract the "x" values to find the	Sometimes people like to record symbols of places in their neighborhood, town, city, etc. to help them determine how far each place is from another.	How do you graph and solve mathematical problems on a coordinate graph?
4	9/18/2013	How to graph and solve mathematical problems using a coordinate plane, and convert a real-world situation into an equation	Today, on learnzillion.com, I learned how to graph and solve mathematical problems on a coordinate plane such as determining the length and width of a rectangle (drawn on the plane). Also, I learned that you can solve mathematical problems on coordinate	Sometimes we can use equations to solve real-world situations such as how much will you have to pay to supply a sports team with snacks, uniforms, etc.	What other types of information can you graph and solve on a coordinate plane?
5	9/23/2013	Matching data tables and stories with given graphs	Today, in class my group and I (Wendy, Michelle, and Tiffany) worked on an interactive matching activity. In this activity, we had to match each given graph with a story by looking at the shape and appearance of the line connecting the data and how it r	Sometimes companies use graphs to help tell and explain the story of how money they've made over the past few days, months, years, etc.	What other techniques are there to help me match given graphs with stories and data tables?
6	9/25/2013	Read and Write an Algebraic Expression Containing A Variable, Compare rates of speed by comparing equations that represent the relationship between distance and time	Today, on learnzillion.com, I learned how to create an algebraic expression containing a variable by reading keywords. Keywords can help you figure out what operation to use in your equation. For instance, some keywords that stand for addition are add	Sometimes people like to determine who can run the fastest using comparisons of different distances. Therefore, it is logical to find the unit rate.	Is finding the unit rate the only way to compare speed?
7	9/30/2013	Number Patterns I — Tables, Ordered Pairs (First Half)	Today, on Braingenie, I learned how to find number patterns in tables by finding the relationship between the top row and the bottom row. In other words, you have to figure out what operation to use in order to get the other number. Also, I learned how	Sometimes charities find the patterns of numbers in tables or ordered pairs to help them determine how much money they've made over time.	What other methods are their to finding number patterns in tables and ordered pairs? Are gallons, quarts,

Microsoft Excel - 02 Richard's Learning Plan					
A	B	C	D	E	
1	Date	Activity Name	Summary of What I Learned	Connection to My Project/World	Questions I Have
2	9/11/2013	ordinate planes	I learnt how to find the distance unit on the cordinate plane	We use it in math class.	I have no questions.
3	9/16/2013	ordinate planes	I learnt how to line them up equally and make it easier for me to see it.	We use it in our everyday school lives.	I have no questions.
4	9/23/2013	Equations	I learnt how to do Equations .	We do this in math class.	I have no questions.
5	9/25/2013	ordinate planes	I learnt how to find the coordinate plane and subtract the negative decimals	WE do this in math class.	I have no questions.
6	9/30/2013	Equations	I fixed and learnt how to do an equation	We do this in our everyday math class.	I have no questions.
7	9/30/2013	Patterns	I learnt how to make number patterns increase and decrease in an order.	we use this in our everyday lives.	i have no questions.
8	9/30/2013	Number Patterns	I learnt how to make tabels with high and very low numbers in it.	we use this in our everyday lives.	i have no questions.
9					
10					

Jocelyn's learning plan was descriptive and detailed in general. Her activity names and summaries were easy to follow and understand. For example, on September 18, 2013, when she was learning about coordinate plane in math, instead of simply giving the activity title as "Coordinate Plane," she expanded it to "How to graph and solve mathematical problems using a coordinate plane, and convert a real-world". Moreover, her summaries of what she learned usually entailed details like the website she was accessing and even examples of what she was learning. Here is the summary that she wrote for the September 18, 2013 entry:

“Today, on *learnzillion.com*, I learned how to graph and solve mathematical problems on a coordinate plane *such as determining the length and width of a rectangle* (drawn on the plane). Also, I learned that you can solve mathematical problems on coordinate”
(Jocelyn’s Individual Learning Plan, Math Entry on September 18, 2013, italics mine)

In addition, Jocelyn consistently made an effort to describe connections between what she learned and real world applications using examples from sports and business. Finally, when she asked further questions about the learning activities, she tended to mindfully request for “more” about the topics (e.g., “What other types of information can you graph and solve on a coordinate plane?”).

Richard’s learning plan, on the other hand, was brief compared to Jocelyn’s. Name of activity was shortened to a simple one or two word vocabulary like “Equations”, “Coordinate Planes”, and “Patterns.” Also, his activity summaries were one sentence long (e.g. “I learnt how to find the distance unit on the coordinate plane” and “I learnt how to do Equations.”—from Richard’s Individual Learning Plan, Math Entries on September 11, 2013 and September 23, 2013, respectively). Moreover, when Richard wrote about connections to the world, he either said “We use it in Math class” or “We use it in our everyday lives.” He did not have any further questions about any topics that he learned during September 2013 when blended learning first started.

Yet, there were some interesting and important trends in Richard’s learning plan as the school year went on. While Jocelyn’s individual learning plan remained consistently organized and detailed throughout the school year, Richard’s grew and expanded. Although the activity names in his learning plan continued to be simple, his summaries, connections to real world, and questions became more elaborate and reflective (see Figure 8 for a comparison between Richard’s September and February entries in his individual learning plan). For instance, in the February 25, 2014 entry that Richard titled, “Slopes,” he summarized what a slope was instead of just claiming that he learned about slopes:

“I learnt that the slope of a line (also called the gradient of a line) is a number that describes how "steep" it is.”

Moreover, in the same entry, Richard gave more than one example about using slopes in real life:

“An example of slope is a roller coaster track's slope is a comparison between the change in vertical height verses the change in horizontal length. Another example is distance and time. Like a trip where you gather how far you drive and the time”

Despite Richard’s further questions about the topic did not involve any specific math concepts, he expressed his interest and willingness to learn and practice more on the topic.

Figure 8: Richard's Individual Learning Plans in February (light blue) Compared to September (light green)

	A	B	C	D	E
16	Date	Activity Name	Summary of What I Learned	Connection to My Project/World	Questions I Have
20	9/23/2013	Equations	I learnt how to do Equations .	We do this in math class.	I have no questions.
21	9/25/2013	coordinate planes	I learnt how to find the coordinate plane and subtract the negative decimals	WE do this in math class.	I have no questions.
22	9/30/2013	Equations	I fixed and learnt how to do an equation	We do this in our everyday math class.	I have no questions.
23	9/30/2013	Patterns	I learnt how to make number patterns increase and decrease in an order.	we use this in our everyday lives.	i have no questions.
24	9/30/2013	Number Patterns	I learnt how to make tabels with high and very low numbers in it.	we use this in our everyday lives.	i have no questions.
45	2/24/2014	Prisms	The sides of a prism are parallelograms (flat shapes that have opposites sides parallel) A prism can lean to one side, making it an oblique prism, but the two ends are still parallel, and the sides are still parallelograms! But if the two ends are not par	A triangular prism is a prism that has three sides. It is used in geometry. Real life examples of a triangular prism are a wedge of cheese an a roof of a house. Another example of a real life triangular prism is a Toblerone candy bar.	Can you post some stuff on Khan about this for me.
46	2/25/2014	Slopes	I learnt that the slope of a line (also called the gradient of a line) is a number that describes how "steep" it is. In the figure above press 'reset'. Notice that for every increase of one unit to the right along the horizontal x-axis, the line moves d	An example of slope is a roller coaster track's slope is a comparison between the change in vertical height verses the change in horizontal length. Another example is distance and time. Like a trip where you gather how far you drive and the time at each d	On tuesdays can we work on this a little bit more so that i will understand this a little bit better and be an expert like you.

When I observed Richard in class, I could see him struggling in both the learning activities as well as focusing on learning. He seemed to need more time for each activity in general. Unfortunately, as he tried to keep up with other students, he didn't seem to pace himself well to learn all activities. As indicated in his learning plan, there were quite a few missing entries, especially in January and February, 2014. In addition, Richard also resorted to plagiarism at a later point this school year with his activity summaries and questions. In his interview, Richard described how blended learning was like a two-edged sword, both helping and hurting him:

“Blended learning is good [for me] because I can work individually on my own pace. I don't have to worry about others bothering me. But I try to keep up with others. And sometimes I become lazy and copy my reflections over and over again. [Teachers] said I plagiarized so I got some zeros.” (Student Interview with Richard, May 28, 2014).

Jocelyn's and Richard's learning plans are two examples that can help me see how different students learned or struggled during blended time. For a high achieving student like Jocelyn, the blended time and her individual learning plan helped her to reflect on what she learned and think about how she could extend her learning. At the same time, for a struggling students like Richard, blended time provided him with a self-pace environment for learning. The individual learning plan also helped him to develop self-reflection and communication skills.

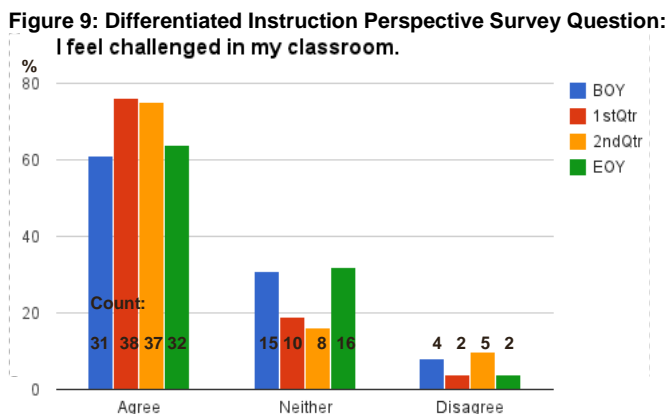
In sum, based on the order, pace, and content quality of students' individual learning plans, the effectiveness of the blended time for every student to learn autonomously was dependent on the amount and kind of activities in the learning playlists that teachers assigned to the class as well as on how students perceived the expectation of the teachers regarding the completion of assignments. Hence, when creating learning playlists for blended time, I need to work with subject teachers so that those playlists would include a variety of mandatory and optional activities that engage and encourage students to learn at their own pace.

Differentiated Instruction (DI) Perspective Surveys

A differentiated instruction perspective survey was administered to students at the beginning of each quarter for the first 3 quarters and at the end of school year. This survey had six questions that attempted to find out how students felt about whether their learning needs were being addressed through the school year (number of students who took the surveys were 50; see Appendix III for results for all questions). In the following sections, I am going to examine the results of three questions that looked at how students perceived a couple of aspects of differentiation—challenge and choice—were implemented in the blended learning model.

Challenge in Learning

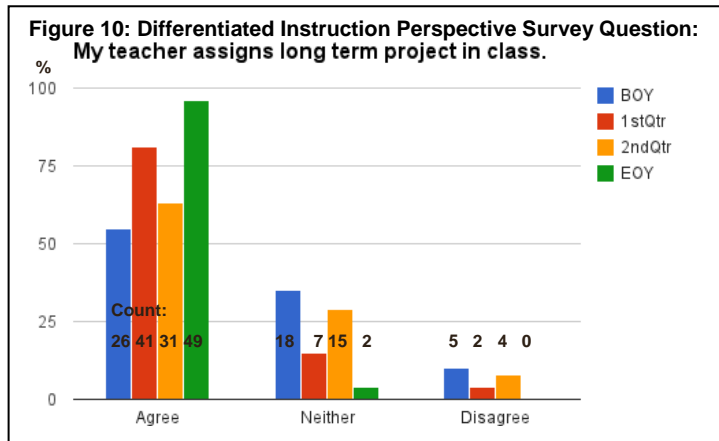
One important reason for us to implement blended learning in our classrooms was because some students were “bored” and did not feel challenged enough. I was hoping to see that an individualized learning could provide the right amount of challenge to engage students in learning activities. The survey results indicate that the number of students who felt being challenged to learn in their classroom increased from 31 to 38 after the first quarter and remained as high as 37 students after the second quarter (see Figure 9). At the end of the school year, however, the number of students who felt being challenged to learn dropped back to 32. My interview with one of the students, Kristi, talked about the challenge she experienced with this blended model:



Kristi: “When we first started with [blended learning], we didn’t know how to finish all the activities in the student portal. Then we also needed to finish a project. We did it with members who we didn’t pick and sometimes it is challenging if you have to work with someone who you may not like. Well, after second quarter, we probably got used to the blended learning time and everything became more ‘natural’ to us.” (Student Interview with Kristi, June 4, 2014).

Kristi might have interpreted the word “challenge” in the survey a bit more general with respect to her classroom experience as a whole rather than how I intended it to be, which should be more focused on the academic side of blended learning. Though, now I realize that challenges for students could come in different forms—from contents to collaboration with peers—and probably not all kinds of challenges would foster meaningful engagement in learning. I must be mindful of providing adequate guidance to students when I expect them to encounter challenges during blended learning. They could be academic challenges like what Richard was experiencing or social challenges like what Kristi encountered.

Another component of our blended learning model included project based units. These units were designed to provide a purposeful way for students to apply what they learn during blended time to solve a real world problem collaboratively with their peers. Two projects were done this school year—one during the first quarter and another during the third. At the end of the school year, almost all students agreed that their teacher assigned long term projects to them (see Figure 10). Students were engaged with both of the projects and the completion rates were both 100%. When I asked students about how they felt about these projects at the end of the school year, Xing Yi said,

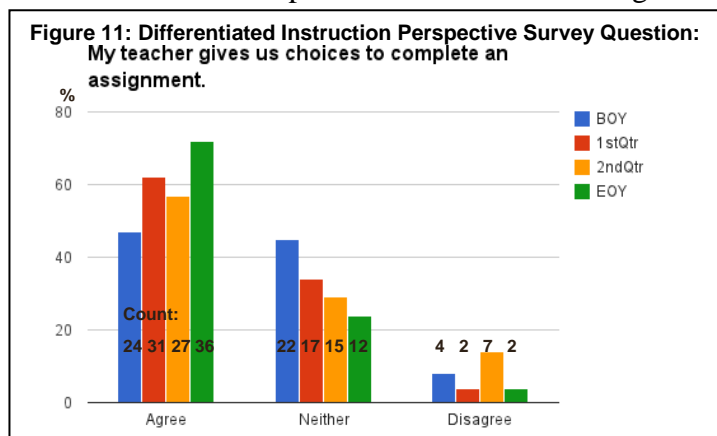


“Well, the prairie project was a bit confusing since we didn’t know how to deal with such a big project at the beginning of the school year. We needed to use both our math and science knowledge to solve the problem, I guess. The teachers helped us a lot. The second project was much more fun. We were able to choose our genetics topic and we got to interview experts about genetically modified food. It was a lot of work also but we could choose how to present our work. What is our next project?” (Teacher Journal, April 28, 2014)

Unfortunately, for our enthusiastic students who looked forward for another problem to solve with their math skills and science knowledge like Xing Yi, there was not a third project. Problem based projects seemed to have provided students with great challenges to apply their knowledge and seek out new information. In addition, these projects provided students with choices not only within the topic of the project but also the way to solve the problem and how to best present their work. This leads to the second aspect of differentiation that our blended learning model attempted to provide for our students.

Choices, choices, choices

Another important aspect of meeting the needs of students is to provide choices for learning and allow them to have different ways to demonstrate their learning. According to the DI perspective surveys, at the beginning of the school year, 24 students (48%) felt that they were given choices to complete an assignment. By the end of school year, 36 students (72%) felt that way (see Figure 11). Students were allowed to use Microsoft PowerPoint and Prezi to present their first problem based project. However, when the teachers discovered



that students tended to “read off” their texted-based presentations, the teachers decided to allow students to select their own choice of presentation mode and tool for the second project. It ended up with 3 news broadcast videos, 2 live court case reenactments, 2 game shows, 3 multimedia online presentations, and 2 PowerPoint/Prezi style presentations (see Figure 12 for examples).



The DI surveys help me understand that the blended learning model was providing students with challenges and choices. As Kristi said, “We like blended learning because we can learn at our own pace. Also, it has a wider range of resources. We can

learn from different websites.” (Student Interview with Kristi, June 4, 2014). The next important step for my collaborating teachers and I to continue with implementing this blended learning model is to tailor specific activities for individual students. We want to achieve as much differentiation as possible to help students succeed individually and as a group.

Conclusion

The blended learning model implemented this school year was a pilot innovation for our 7th grade classes. Students maintained their learning habits and tried to finish all assigned work on their learning playlists. Since the playlists were long, students simply followed the learning activities in a linear order. At the same time, students did take advantage of the self-pacing nature of blended learning. Students worked both at school and at home to finish their assignments at various times. The completion rate of blended learning assignments was considerably high. Although student needs might not have been fully addressed by individualized playlists, student engagement with problem based projects increased as challenges and choices were given.

Did Students Learn as Well in Blended Learning?

Ms. V, the math teacher of this blended learning model, looked at the Northwest Evaluation Association Measures of Academic Progress (NWEA MAP) assessment results for the 7th grade students and declared, “Their Math scores are very impressive. They gained much more than the last year’s group.” At the same time, Ms. C, the science counterpart, told me that she assessed the 7th grade students with a pre/post science test and found that the students moved from an average of 10% mastery at the beginning of the school year to a 75% at the end of the school year. (Teacher Journal, May 21, 2014).

Policy Recommendations

National Level

- Establish a Common Core State Standards based Inquiry Units/Projects Repertoire that involves universities, national labs and museum, and other private organizations.
- Initiate a systematic movement in schools to involve students in solving authentic, real world problems locally, regionally, and globally.
- Allocate funds for technology to connect US classrooms nationally and globally.

Local/District Level

- Survey teacher needs for technology professional development and strategically plan meaningful technology professional development within district.
- Provide schools with the option to flexibly using instructional minutes that involve multiple subjects and interdisciplinary curriculums.
- Allocate funds for one-to-one devices for each student.

School Level

- Schedule time periodically (weekly or monthly) for teachers to collaborate, design, and implement technology enhanced integrated units.
- Mandate using technology as part of the curriculum tools like textbooks in classrooms and semi-annual classroom technology integrated projects.
- Create a mechanism/channel to support students who might fall through the crack with technology and learning in an autonomous setting—something like a learner support team with open, caring personnel for proactive academic counseling.

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Appendix I – Time on Task Log Example

Time On Task Observation Form (30s intervals) Observer: _____ Date: 10/23/2013

Student: M.N.

Student:

Start Time: 11:55 am

Start Time:

Off task behaviors : Off-task motor (OTM); Off-task verbal (OTV); Off-task passive (OTP)

On-Task Behaviors: Looking at teacher when giving lesson, directions and/or instructions (L); Participating in class discussion (P); Working on seat work (S); Working cooperatively on cooperative project (C).

eq equipment; lp learning plan; q question; wk wiki; bg braingenie; gg google; dis discussion; tchr teacher;

30	c eq 1	30	c 3	30	c eq 1		30		30		30	
1	c eq 1	11	c 4	21	c eq 1		1		11		21	
30	c eq 1	30	c 4	30	c eq 1		30		30		30	
2	c eq 1	12	c 4	22	c eq 1		2		12		22	
30	otv	30	c 4	30	c eq 1		30		30		30	
3	c eq 1	13	c 4	23	c eq 1		3		13		23	
30	c dis	30	c 5	30	c eq 1		30		30		30	
4	c eq 1	14	c 5	24	c eq 1		4		14		24	
30	c dis	30	c 5	30	c eq 1		30		30		30	
5	c dis	15	c 5	25	c eq 1		5		15		25	
30	c tchr	30	c 5	30	c eq 1		30		30		30	
6	c eq 1	16	c dis	26	c eq 1		6		16		26	
30	c eq 1	30	otm 6	30	c eq 1		30		30		30	
7	otm 2	17	otm 6	27	c eq 1		7		17		27	
30	c dis	30	otm 6	30	c eq 1		30		30		30	
8	c tchr	18	otm 6	28	c eq 1		8		18		28	
30	c eq 3	30	c eq 1	30	c eq 1		30		30		30	
9	c 3	19	c eq 1	29	c eq 1		9		19		29	
30	c 3	30	c eq 1	30	c eq 1		30		30		30	
10	c 3	20	c eq 1	30	c eq 1		10		20		30	

eq equipment; lp learning plan; q question; wk wiki; bg braingenie; gg google

<p>notes: 1 prezi (individually but collaborative online and verbal) 2 fountain 3 looking for ms. jones 4 talking to ms. jones 5 going back to room 6 drinking fountain</p>	<p>notes:</p>
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Off task behaviors : Off-task motor (OTM); Off-task verbal (OTV); Off-task passive (OTP)

On-Task Behaviors: Looking at teacher when giving lesson, directions and/or instructions (L); Participating in class discussion (P); Working on seat work (S); Working cooperatively on cooperative project (C).

Appendix II – Student Individual Learning Plan (Partial) Example

Student Individual Learning Plan: Student Profile Sheet

Profile

Name:

Homeroom:

School Year: 2013-14

Beginning Date of Plan: 9/5/2013

Academic Scores

Date

NWEA Math RIT Score: Spring 2013

NWEA Reading RIT Score: Spring 2013

About Me

Interests: Animals, Creating Art, Swimming, Volleyball, Geometry, Reading Action, Mystery, and Realistic Fiction, Mangos

Preferred Ways to Learn: Listening when taking notes, reading when comprehending

Strengths: Reading, Writing Essays, Multiplication Tables, Geometry, Probability

Concerns: Not getting into a good high school, improve working with decimals and percents, understanding hard word problems (math)

Student Individual Learning Plan: Math Learning Sheet

Math Plan

Quarter:

Quarter

Goals:

- 1 (Content) My first content goal is to be able to solve Algebraic equations
- My second content goal to do more practice on solving problems using the Pythagorean Theorem
- 2 (Content)
- 3 (Skill) My first skill is to be able to identify number patterns.
- My second skill is to be able to use the functions on my calculator to solve
- 4 (Skill) Algebraic equations.

Date	Activity Name	Summary of What I Learned	Connection to My Project/World	Questions I Have	Mastery	Grade	Feedback
9/9/2013	Diving Decimals	Move the decimal to make the divisor a whole number, then move the dividend that same amount of places, use long division to divide (move the decimal point to the "roof.") Today, on kahnacademy.com, I practiced interpreting and reading pictographs and identifying composite numbers.	We use dividing decimals to divide up a restaurant bill.	How do you do long division?	I got It!		
9/11/2013	Pictographs, Composite Numbers, Use absolute value to find distances between points, and find the distance between two points in different quadrants	On learnZillion.com, I learned that you can determine the distance between two points on a coordinate graph in the same quadrants or not by finding the absolute value of the differences of the values. Absolute value is the distance of the number from 0. Today, on learnzillion.com, I learned how to graph symbols of different places on a coordinate plane to show their locations. When you are determining the distance of a pair of values with the same "y" values, you only subtract the "x" values to find the width.	Sometimes people record data such as average salary per job type on pictographs.	What are some other types of information you can show on a pictograph?	I need more practice.	10	What do you need practice on?
9/16/2013	How to find the length and width of a rectangle given four points on the coordinate plane, and graph and solve real-world problems using a coordinate plane	When you are determining the distance of a pair of values with the same "x" values, you only subtract the "y" values to find the length (Answers should always be in absolute value.)	Sometimes people like to record symbols of places in their neighborhood, town, city, etc. to help them determine how far each place is from another.	How do you graph and solve mathematical problems on a coordinate graph?	I got It!	10	It's help for distances, areas, perimeter (depends on what the question is asking)

Student Individual Learning Plan: Science Learning Sheet

Science Plan

Quarter:

- Quarter Goals:
- 1 (Content)** My first content goal is to learn more about what types of animals live in the Prairies.
 - 2 (Content)** My second content goal is to learn more about plants found in the Prairies.
 - 3 (Skill)** My first skill is to be able to identify the 5 kingdoms.
 - 4 (Skill)** My second skill is to be able to read food webs and chains.

Date	Activity Name	Summary of What I Learned	Connection to My Project/World	Questions I Have	Mastery	Grade	Feedback
9/9/2013	Bird Adaptation-Beaks	Today, I learned about how animals adapt to their surroundings and environment. An adaptation is a species' ability to change in order to survive in their environment or area.	This connects to the field manual I am making because I need to know how the species adapt to their surroundings.	How do the beaks of birds adapt over time? What other characteristics of organisms adapt over time?	I got It!		
9/11/2013	The History of Life on Earth (First Half)	Today, I learned that Planet Earth was formed about 4.6 Billion years and about 4.4 Billion years, Earth had no oxygen at all. Volcanoes were active and water was turned into liquid from water vapor. I also learn that Earth has had three major eons in its history (Phanerozoic, Proterozoic, and Archaen). Finally, I learned that oxygen was originally produced from cyanobacteria.	This connects when I was studying the Earth's Atmosphere in science class in 6th grade and learned that the amount of oxygen on Earth gradually increased as time progressed.	How can I learn more about cyanobacteria?	I got It!	10	Great connections! To learn more about adaptations check out this link. http://www.bozemanscience.com/ngs-ls4c-adaptation/ Also, if you are interested in learning more specifically about bird beaks, try google. Let me know if you find any cool resources to share.
9/16/2013	The History of Life on Earth (Second Half), Population Ecology: The Texas Mosquito Mystery (First 5 minutes)	Today, I learned that originally all of Planet Earth's continents were bunched together into a landform called "Pangea" which consisted of modern pines and birds. Also, I learned that Ecology is basically the history of the Earth as it is constantly changing and being affected by various geological events.	This connects to when my class and I was studying the history of Planet Earth and learned about how the landform of "Pangea" gradually transformed into various continents over the years (6th Grade).	How can I learn and study more about Ecology?	I got It!	10	Ecology is what we are studying this quarter. There are many cool resources on the different types! http://eco-globe.com/types-of-ecology/

Student Individual Learning Plan: Project Rubric Sheet

Rubric for Daily Reflections

Points	Description
10	Reflections include strong summaries of the activity and evidence/awareness of new learning. Strong connections are made to the unit project or world. Asks thoughtful and relevant questions.
9	Reflections contain strong summaries of the activities and evidence/awareness of new learning. Also reflections contain some basic connections and questions.
8	Reflections contain basic summaries of the activity and evidence/awareness of new learning. Also reflections contain some basic connections and questions.
7	Reflections show little evidence of new learning and is not detailed
6	Reflections are incomplete or missing dates
5	Refelctions? What reflections?

Your reflections will be graded weekly for an entire week's worth of reflections.

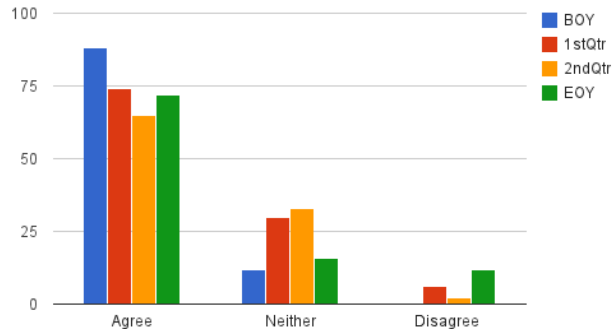
<http://restoring-prairie.wikispaces.com>

Components	Guiding Questions	Points
What? (Week 1-2)		
Define Problem	What is the problem that you are trying to solve? Why is it important?	5
Research solution options	Three possible solutions. Where has it been used before? What happened?	10
Solution Rationale	Why did you choose this particular solution? (Claim, Evidence, Reasoning)	10
How? (Week 3-4)		
Logistics	Where will your solution take place? What materials will you need? Where will you get the materials? Whose permission do you need? Who will care for the plot? How long will it take to construct?	10
Abiotic/biotic Factors	What are the abiotic factors? How do you know? What wildlife would benefit or survive in the designed ecosystem?	10
Species of plants Scaled Blueprint of Prairie Plot	What species will be added to the ecosystem? What care do they need? Evidence of success. Do you have biodiversity?	10
Budget	How much space will you need? Design a scaled blueprint. How much does your solution cost? Is it reasonable? Where will you get the money? What percent of the total budget is spent on each item or group of items?	10
Impact? (Week 4)		
Risk Factors/Obstacles	What are some potential risks or obstacles that your solution will face? How will you address these obstacles? What invasive species do you predict becoming a problem?	10
Community perspective	How will people respond to your plan (find 3 stakeholders) and have evidence of their support for your solution?	15
Total		100
Presentation		
Articulation of Solution	Present claim, evidence, and reasoning	30
Presentation Format	Be creative, not just copy and paste text onto a slide! Presentation should clarify your proposed solution and emphasize the main points.	10
Individual Communication	Each person must speak (eye contact, volume, clear pronunciation)	10
Total		50
Participation		
Group Reflection	Each member will divide up 100 points among the group members after reflection on participation of the group member	25
Teacher Reflection	Based on teacher observation of participation of each group member. Meets expectations set at the beginning of the year in participating both individual and group work	25
Total		50
Group Share		
Preparation	Come to discussions prepared to share idea with a 5min pitch. Brainstorm answers in advance to possible questions.	5
Discussion etiquette	Follow rules for collegial discussions (balanced participation, active listening and freedom to question or disagree)	5
Questioning	Pose questions that elicit elaboration and help the speaker think critically about their idea.	5
Feedback	Analyze the main ideas and supporting details presented. Provide specific feedback.	5
Total		20

Appendix III – Differentiated Instruction Perspective Surveys Results

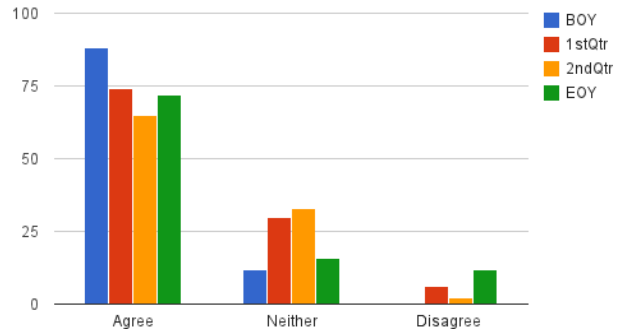
Question 1:

My teacher pre-test us before introducing new concepts.



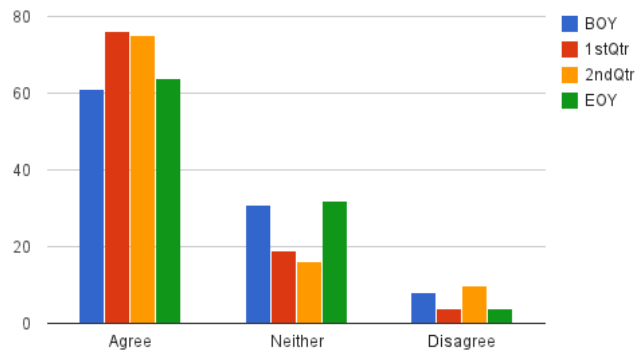
Question 2:

My teacher pre-test us before introducing new concepts.



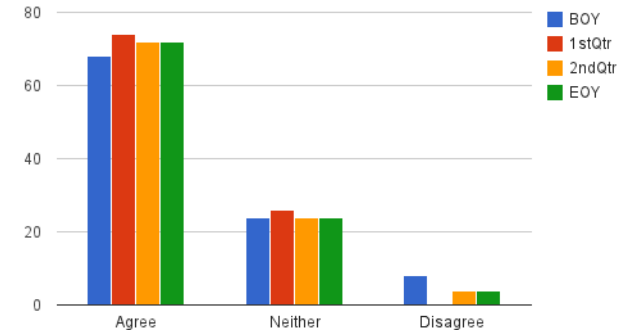
Question 3:

I feel challenged in my classroom.



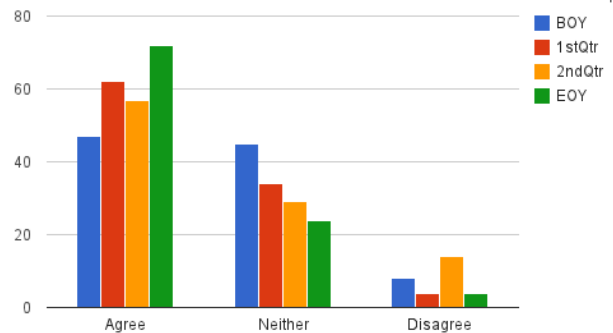
Question 4:

My teacher lets us demonstrate our learning in different ways.



Question 5:

My teacher gives us choices to complete an assignment.



Question 6:

My teacher assigns long term project in class.

