Effects of Online Collaborative Learning on Student Engagement and Academic Success

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ABSTRACT

This study seeks to increase the effectiveness of online collaborative learning in Middle School Science classrooms and explore its impact on student beliefs and attitudes toward collaborative learning. Historically, many students, parents and educators have not appreciated the effectiveness of cooperative learning, due in part, to adverse past experience. Corporations today demand in their employees collaborative skills lacking in many of today's graduates from secondary schools. Our students require these skills and experience to compete in our current and future economy. Research has shown that collaborative learning projects support dramatic increases in engagement leading to deeper understanding and higher-level thinking. These results have been seen only in learning environments where students receive training to function in collaborative groups, have a structured project with goals, roles, and outcomes, and are given regular feedback from teachers and peer group members regarding individual contributions and personal group effectiveness. Using an experimental design with three subject groups receiving varying levels of support for developing collaborative skills and group functioning skills the study aims to quantify how much support and qualify which support materials will best improve student learning, individual accountability, and student held beliefs about the efficacy of collaborative learning in middle school classrooms. Results from this study have shown that collaborative online learning does benefit from scaffolding that supports collaborative planning and feedback from peers and teachers. Additionally, the efficacy of online collaboration may be less than face-to-face collaborative learning.

Introduction

Adolescents today are immersed in internet-connected activity. They are making these connections daily with friends and family through social media sites using text, music, and other types of imagery. Our tech savvy adolescents are also making new friends online, reaching out and connecting electronically with the world outside of their local community. Unfortunately, our student's online community is not a part of their academic community. Our students are creating and expanding their community and it is happening outside of their classrooms.

Adolescent Montessori classrooms are expected to be an environment for building community. Maria Montessori states in *From Child to Adolescence*, "self-valuation and the ability to take part in a social organization form a live force". Maria Montessori goes on to say that experience in daily life provides a foundation for the future citizen in society. Daily routines and rituals are in place in Montessori classroom to support individuals as they gain experience and independence as learners and build confidence as members of their community. As our school has adopted 1:1 iPad integration I have observed many of my students engaged in building their online community. At the same time, I have observed students that have become less engaged in participating in the rituals and routines of our classroom and greater school community.

In this study I would like to test tools and materials that would harness the skills and enthusiasm my students have for building their online community and apply them to

online collaborative learning projects in our classroom. I hypothesized that giving students an opportunity to use their tech skills in class while working with other students will build an online learning community that would increase student participation and academic success. I began to research ideas for integrating collaborative projects and build community face-to-face and online in my classroom.

Research shows that online projects are engaging to students and can increase academic success. Research also shows that many students hold the belief that group work is more work than individual work and therefore will be less engaged. The belief that group work is less valuable has been shown to hold true, unless, the learning community is supported while building the capacity to work together and feedback is provided, throughout, by teachers and peers in each project.

From my observations, research, and decision to test tools and materials in my classroom that support online collaborative learning projects, I hope to discover answers to the following leading questions during the course of my study.

1. Which tools whether online or on paper, support collaboration and increase engagement?
2. Does feedback improve participation in collaborative projects?
3. Will beliefs about collaborative work change between supported and unsupported experimental groups?
4. Which online activities improve the quality of collaboration between group

members?

5. Which online applications receive the most use by students groups?
6. Which online applications appear most effective at increasing academic success?
7. How much time is spent online collaborating academically outside of Science class?

Literature Review

Expectations within society, the workplace and our schools require citizens to be technologically literate and to function well in teams or work groups. Teachers and employers have expressed in a variety of media, that many of our young people, are not being prepared to meet these expectations. Teenagers do spend an impressive amount of time using technology but most of that application of technology is entertainment based not academically creative, nor collaborative beyond conversation, and while "raw" tech skills are honed few employable skills are developed. Students in our schools are rarely aware of what might be useful life skills.

Research points to the value of technology beyond employment by engaging students in relevant collaborative projects through the many tools of technology. Studies have shown that collaborative work can significantly increase achievement and further engage students in a deeper learning cycle. Recent research has shown that technology engages students and can be effectively used to support collaborative work, give feedback from peers and educators, and as a tool for data gathering by students and

teachers. Two problems hindering equitable collaborative learning environments have been finding proven tools necessary to prepare and support students, and also, attitudes of the disengaged student's toward collaborative learning projects.

Cooperative Learning: Successful Implementation

Engaging students in collaborative projects has been an integral part of education for years. Many educators implement projects within secondary classrooms that are immense in scope and may take months to complete. Other educators have had little or no success using collaborative projects to build engagement and help students construct deeper understanding of content areas. This dichotomy that exists in our schools continues to cloud the perceived efficacy of cooperative learning as well as limiting its use in many classrooms and for the students within.

Cooperative learning occurs during intentionally constructed group projects where students actively develop a higher level of understanding for themselves and their group partners (Veenman, Benthum, Bootsma, Dieren, & Kemp, 2002). A large body of research supports the strength of cooperative learning's reputation as an application in our classrooms. Collaborative learning, "small group activities through which students strive for both themselves and their friends to reach the highest levels" (Korkmaz, 2012, p. 1162). Originally, developed by Vygotsky and Leontiev (Vygotsky, 1978) in their socio-cultural and activity theories, the significance of learning with others through collaboration has been confirmed repeatedly (Bandura, 1986; Vygotsky, 1978; Roschelle, 1992; Wenger, 1998; Tu and Corry, 2003;). Kormaz (2012), cites Tu (2004), argues that collaboration is an essential

component to creating online learning communities. Research has discovered that well-designed cooperative instruction has a consistently positive effect, leading to an average seventeen percent rise in individual student learning (Urquhart& Urquhart 2012). Additionally, developing a Pervasive Learning Environment (personalized learning through technology) or an online culture of learning within classrooms has been proven to increase engagement and test scores (Oh & Won Hur, 2012).

Research has shown that when children work in cooperative groups, they engage in more task-related interactions than peers who are working either in whole class settings or in untrained cooperative groups. Additionally, as the number of these interactions increases, significantly higher learning outcomes are produced. A multiplying effect is created as well, as the number of collaborative interactions rise; awareness in students of how to give and receive help to other group members is produced. This rising awareness of helping behaviors then increases their use by students and enhances their own perception of the value of being helpful to peers (Gillies, 2004).

Student Attitudes and Beliefs Toward Collaborative Projects

Student attitudes and beliefs about learning affect their willingness to participate, learn and collaborate. Positive attitudes lead to greater participation and learning. Less than positive attitudes limit participation, collaboration and the construction of new meaning. Therefore, the unwilling will need to be identified, assessed, given new opportunities to succeed and ultimately, gain an awareness for, and possibly develop an appreciation for the intrinsic value of collaborative learning.

Carol K. Chan's (2010) research asserts that educators should focus on student beliefs to help them build the capacity to engage and participate online and collaboratively. In her studies, she has found that students view learning through different lenses. Those who think that learning is individualistic are most likely extrinsically motivated and would then be less likely to participate in a collaborative project. Other students, who view learning in a broader sense, perceive a value in communicating their understanding and sharing their ideas. Possibly, these students have experienced situations where a deeper understanding of material was constructed through collaboration. These learners may be considered intrinsically motivated and more likely to participate.

Chan discovered that student beliefs toward learning affected not just participation but also the depth of understanding. She identified learners in collaborative projects as either surface or deep learners. Surface learners are extrinsically motivated, wish to meet the requirements of the project with the minimum effort extended to get their desired grade, share superficially, and rarely construct new meaning or make connections between components of the collaborative project. In contrast, deep learners are intrinsically motivated and more likely to extend a greater amount of effort on their studies, share deeper constructs with group members, connect components within collaborative projects, ultimately understand bigger ideas, and link new information to prior knowledge.

Several researchers have identified tools to identify and quantify the attitudes and beliefs of learners. This information can then be used to form more effective groups, focus instruction to build capacity in those less likely to participate, and support students throughout the current project as well as in future student collaborative projects. Korkmaz (2009), Gottschall and Garcia- Bayotms (2008) have developed questionnaires to identify student attitude towards cooperative learning. In their studies they have found factors in students that limit student participation in collaborative work, previous experience with collaborative learning, academic success in general, and familiarity with other students in the group. These limitations may then be addressed and supported in classrooms through activities that will build student capacity to work in groups by altering their own beliefs and attitudes. Additionally, questionnaires and assessment instruments can be used as a pre-test and post-test to determine methods and opportunities to improve student attitudes toward online cooperative learning.

Some methods to help students alter their own beliefs include building personal connections and attachments to the work group (Woo, C. & Zellner, R. 2011), beginning the project with small opportunities for successful engagement within the group (Gillies, R. 2004) and providing the group with frequent opportunities for success (Korkmaz).

Building Positive Interdependence and Accountability

Cooperative learning has been shown to increase achievement, engagement and build positive interdependence and accountability in-group members when three strategic components are in place (Urquhart& Urquhart 2012, Nam & Zellner 2010). These three areas, structured lessons with tools to improve group processing and interpersonal skills, establishing cooperative goal structures within each group, and mechanisms to support accountability in all group members have been repeatedly shown to build effective cooperative teams, learning, and satisfaction in students participating in collaborative projects.

Teaching and Coaching Group Processing and Interpersonal Skills

When group members know their tasks, understand the timeline of the project, have determined their individual roles and recognize the strengths group members bring to the project, effectiveness and participation increase. Gillies (2004) and Nam (2010) found that students receiving teacher and student led group skills training before and during collaborative projects produced more positive interactions, better peer teaching outcomes, more time was spent using higher order thinking to problem solve, and perceived their groups and their role in them as being more effective.

Cooperative Goal Structures

Several methods have been suggested to establish cooperative goal structures. Urquhart and Urquhart (2012) have found that linking outcomes, assignment completion for instance, among group members will benefit individual participation and increase learning. It is suggested that linking grades as an outcome should be

avoided but that distributing tasks, materials and other resources among group members significantly increases participation and provides opportunities for students to have success as a group early in the process and increases satisfaction among members.

Provide Mechanisms for Individual Accountability

Participation by all group members in the collaborative process continues to be the largest hurdle facing the acceptance and implementation of collaborative projects as a proven method of engaging students and increasing higher-level thinking. Many students participating in collaborative projects feel that they will do most of the work so they might as well work independently. Parents do not want their children to shoulder the extra work and stress of "pulling" non- participating students along the path of learning. Lastly, teachers do not want to devote large blocks of class time to projects that are perceived by many to be ineffective at reaching their intended targets.

Several strategies have been identified to maximize accountability in collaborative groups. First, groups should be small, three to five members at most. Second, projects should be divided into smaller parts that each group member is responsible for. Third, project progress should be assessed individually and not applied to the group performance. Lastly, feedback should be given weekly by the instructor and peers about group functioning and progress upon the project. As a result of weekly feedback alone, significant increases have been seen in

group functioning, student perception of their individual contribution and value made to the group, and an increased trust in the collaborative process (Nam, 2010; Gillies, 2009;Urquhart, 2012).

Use of Technology to Enhance Collaborative Learning

The use of technology in public classrooms has had mixed results. Roger Geyer states in Research in Middle Level Education (2009) that the Internet is available in ninety-nine percent of public schools where only thirty-two percent of adolescents use it in school (and the ones who do "plead for change"). Geyer later states that, thirty to forty percent of our students are Internet Savvy, or gifted in the use of technology. Daily these Internet Savvy students, "are creating, interacting, collaborating, sharing and exchanging information, original ideas, and artifacts across a connected, distributed environment".

If this is true then we should consider the other sixty percent of our students who are not Internet savvy and discover what is holding them back. Korkmaz (2012) states that student attitudes and beliefs regarding collaborative projects are holding them back from participating. Geyer also finds that the Internet Savvy continue to develop their creative online skill set outside of school, at home or elsewhere. Remembering our Internet unsavvy students, most without home access to the internet, it becomes imperative that we support making internet connections at school for all of our students. Jillian Wendt (2013) has found that online collaborative projects for adolescent students are most effective when only partially online when most of the collaboration is face to face in school. Wendt suggests that group sharing; presentations and feedback from peers and teachers should be limited online

and mostly supported during class time. Our goal as educators should be to capture these savvy students during the school day (potentially 30-40% of our student population) through creative projects and applications that harness their gifts and pull the rest of our students and staff toward a student centered relevant learning environment online, in the classroom, and outside of the school setting.

Conclusion of Literature Review

The relevance of collaborative learning as a vital teaching method has been proven to be effective when specific strategies are included while developing collaborative projects and in their use and application with students. Advantages of online collaboration may limited to a support role, for record keeping, feedback, absentees and for distance learning when students cannot meet face to face. Preparation for collaboration should include developing tools to identify and gauge the attitudes and beliefs of students regarding collaborative learning. Online collaboration should be supported, however, to allow student groups more opportunities to share and encourage engagement in academics outside of class and the school day. Well-crafted projects are required, designed to engage students, both intrinsically and extrinsically, increasing motivation to learn in a collaborative process. Lessons and activities are needed to train students to work together, maintain accountability, learn, and gain trust in the collaborative process.

The intentions of educators will be to cultivate a culture in the classroom and online

where students are accountable to each other in the group, to their teacher, and the outcomes of the project. While students work collaboratively, systems and structures need to be in place to support individual students and groups to gain skills, gain confidence and learn within collaborative projects. Weekly feedback from teachers will support and guide students to trust in themselves and the group. Peer feedback should improve the functioning of the group, improve learning through discussion and critical analysis, and lead to satisfactory completion of the project outcomes. Feedback can be given online when also supported occasionally face to face. Collaborative learning, when applied effectively, will improve student engagement, higher-level learning, interpersonal skills, and change student attitudes and beliefs regarding future collaborative learning opportunities whether online or face-to-face.

Research Questions

1. Which tools support collaboration and increase engagement?
2. Does feedback improve participation in collaborative projects?
3. Will beliefs about collaborative work change between the supported and unsupported experimental groups?
4. Which online activities improve quality of collaboration among group members?
5. Which online applications receive the most use by students groups?
6. Which online applications appear most effective at increasing academic success?
7. How much time is spent online collaborating academically outside of

Science class?

Research Design and Methodology

This experiment includes three Science classes that become three different experimental groups. Two groups work on a collaborative project that receive identical training that supports the collaborative process, feedback about their progress on the expectations of the project and their functioning as a group. These two groups will function in face-to-face collaboration in the classroom and have online components where they share information and create a presentation for online distribution. There is one difference, however, between these two groups, feedback to one (Collaborative 1) is face-to-face and feedback for the other (Collaborative 2) is online only. The third class (Control Group) is the control group. The control group works on the same project with the same expectations, however, each student works independently. The third group also receives feedback on meeting expectations during the project. All three experimental groups will receive a pre and post project survey that will gauge their beliefs and attitudes regarding the value of collaborative projects measuring both academic value and quality of engagement.

This structure was determined to allow the most flexibility in accessing student beliefs and attitudes about collaborative work. Since all students within each group are in one Science classroom the structure also allows for adjustments to be made to the experiment while not cross contaminating and eliminates bias within the other two groups. After, trying some of these experimental ideas on first semester Science

students it was determined that this structure will allow me to compare several variables within the three groups. One variable, academic success of independent project work compared to academic success during collaborative project work. Another variable measured, the validity of face-to-face feedback compared to online feedback, both academically and toward increasing student engagement. Lastly, measurement of student held attitudes and beliefs regarding the value of collaborative learning and using this as a means of increasing student engagement.

The data I have collected includes; pre and post project survey (Figures 1-3) data regarding student held attitudes and beliefs toward collaborative learning. Students have used a daily log (Appendix B) to record their engagement time working on the project, and the class average project rubric score of each experimental group (Figures 4&5) to measure academic success.

During this project I have had some success developing tools to measure student attitudes toward collaborative learning and continue to improve the quality of tools for recording data online (Google Docs, Edmodo). Improvements need to be made in supporting student collaborative groups to prepare to work together, while participating in the collaborative project and find more time for students to reflect on their participation. If improvements are made I believe more students will change their beliefs about collaborative work and improve engagement in all collaborative projects.

Participants and Setting

The participants in this study include all students in all three of my Montessori Science classes during Spring Semester 2014/2015. The setting is an urban public school that is developing a Montessori Adolescent Middle School Program. The total school population is approximately 500 students. The data for this study has been collected from Spring Semester 2014/2015. The students in the three classrooms range in age from eleven to fifteen and are in mixed age classrooms with Sixth, Seventh and Eighth Grade students. The control group contains twenty-eight students. Collaborative 1 group twenty-three students and Collaborative 2 contains thirty students. I was inspired to implement and research online collaborative projects in my classroom to address the needs of my students. Observing and reflecting student interest in creating and improving their online community I believe it necessary to encourage all learners to use their technological skills and interest to improve their engagement at school and future success in life.

Materials

My examination of student's participation in collaborative projects required tools to track student engagement, identifying students attitudes toward collaborative work, analyzing academic performance, and structures to support student functioning within their group. I used a Student Daily Engagement Log (Appendix B) that students were to fill out each day in Science class. This tool was designed for students to record their own determination of the percentage of time they devoted to academic coursework during each class period. I then recorded their log data in an Excel spreadsheet to be used later while comparing engagement between the three experimental groups.

To measure student held attitude and beliefs I created a survey on Survey Monkey (Appendix A) that students were asked to participate in casually before being informed about a collaborative project soon to start in class. This data was recorded in an Excel spreadsheet to be later used in comparison with the results of an identical Post Collaborative Survey students participated in following completion of their Earth History collaborative project.

One goal of this study is to measure any differences in academic achievement of students during coursework completed independently compared to coursework completed collaboratively. I have attempted to measure this by averaging Group Rubric (Appendix C) scores that student groups receive in each of the experimental groups.

Support for student success within collaborative groups included roles development and assignments for each group member (Appendix E), suggestions about how to divide up project details, and a tracking sheet (Appendix F) that allows student groups to monitor their daily progress.

Other materials that students and I have used during this study include iPads to research with and create online, Google Docs, and the classroom and neighboring space where the experimental groups work independently or collaboratively. The one to one iPad adoption has been difficult for multiple reasons and in many ways but that would be grist for another study or two. The use of the iPads however have also created

opportunities for students to have access to more information that has the potential to deepen their understanding of academic content. At this time we are still just scratching the surface of the impact and influence on our students and schools. With that said the use of iPads in class, currently, has been a distraction for many and a management issue that requires monitoring and redirection in order to maintain academic engagement. Google Docs have been used as the hub for student online collaboration, sharing presentations, and for one experimental group, the method for sharing teacher feedback. The space in the Science classroom is set-up with big tables and has room for groups to meet, spread out and collaborate face-to-face. Additionally, the room has a few places for individuals to isolate themselves and find a space for them to quietly work alone. We also have opportunities to break out of the classroom and use the adjoining space (second photo below) when another adult is available to supervise.

Procedure

Before introducing even a mention about the Earth History Timeline Project each students participated in a pre-survey regarding their attitudes and beliefs regarding collaborative learning projects. This survey was administered online through Survey Monkey and the results recorded in a spreadsheet for later analysis. Students were later introduced to the details in the timeline project and for the those students in the Collaborative Experimental groups they received group assignments and access to online resources through Google Docs. Collaborative groups were then allowed to meet and determine how they will divide roles and assignments among the group members.

As the project progressed I was able to support individuals and student groups by floating throughout the classroom with my computer or iPad. I was also able to "see" what work was being done online as they created and updated their Google Doc online portfolios. Occasionally during these periods of floating I was also able to observe and reflect on student engagement regarding specific details of their work assignment for the day. All three experimental groups received my support with questions about specific details of the project, technical questions about use of the online resources, and reminders about daily updates to their Participation Log and their groups Group Progress Tracking Report.

As students finished their projects the next phase of data could be collected. When final projects were submitted I could then determine their score on the project rubric. I could then collect these scores in an Excel spreadsheet for later analysis. To complete data collection individual students were then asked to take another survey on Survey Monkey. It was identical to the Pre-Survey given before the project began. I did not, however, emphasize that it was the same survey.

Data Analysis and Results

The intention of this study was to confirm that student beliefs regarding collaborative learning can be changed and that collaborative projects improve academic success. The Pre and Post Collaborative Project Survey measuring student held beliefs regarding collaborative projects, shows a very slight improvement in the benefits of working together collaboratively. Analysis of three specific questions (Figures 1-3), support the

claim of a slight improvement towards the benefits of collaborative projects but may not be statistically significant. Figure 1 describes student answers to a question measuring their affinity toward working on projects with others. A very small improvement occurs across the Pre and Post Surveys.

Figure 1:

Survey Question Number 1

Do you like working with other students on group projects?

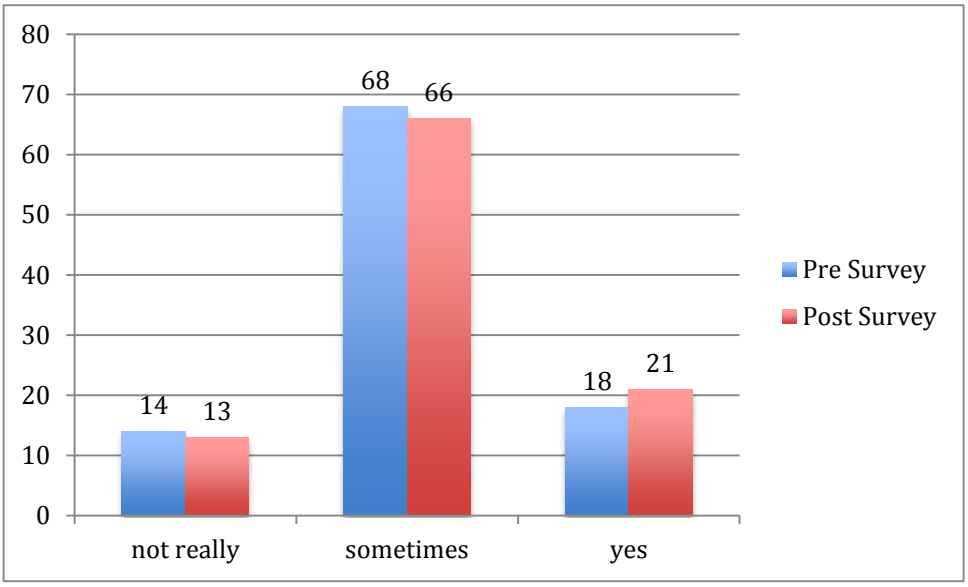


Figure 2 describes the results of a question probing student experience regarding inequities between group members and their contribution to a collaborative project. The results are a mix showing a slight improvement in student attitudes toward collaborative projects over the course of this study.

Figure 2:

Survey Question Number 4

If you think about your past experience working in groups at school do you think that every time you have worked in groups that someone has done more work than others?

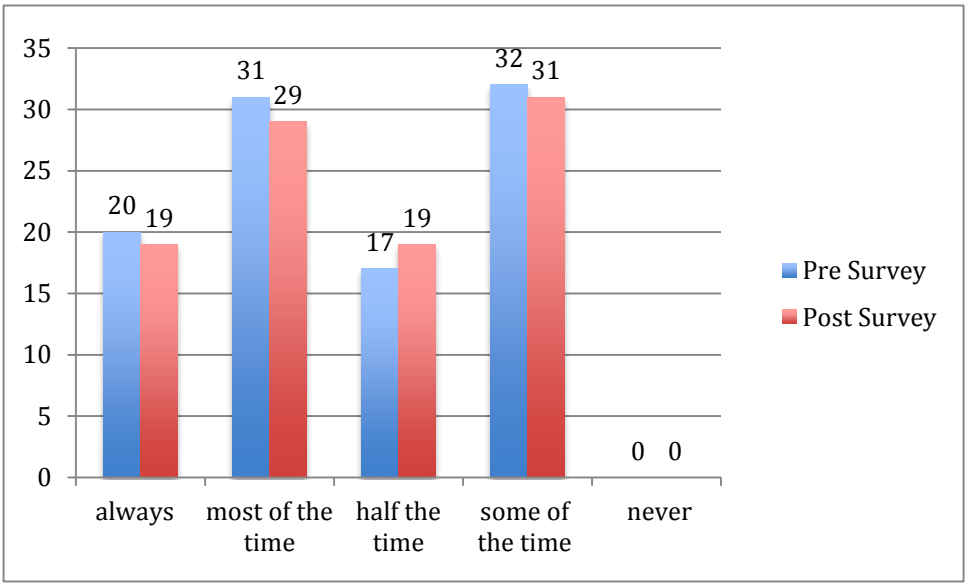
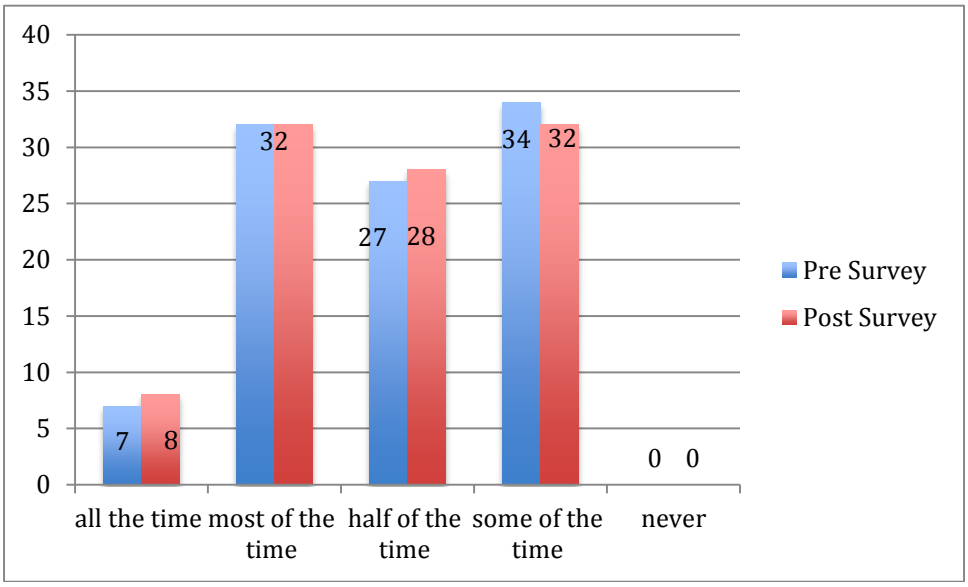


Figure 3 describes analysis of results regarding student attitudes about past projects that worked well. The survey data shows that all students at some time have had success participating in collaborative learning projects. In fact well over sixty percent of students have experienced successful collaborative learning at least half of the time they have participated. Once again, a slight positive increase occurred in student attitudes between the Pre and Post Survey results.

Figure 3:

Question 7

Have you ever been in a group at school doing a project where you thought your group worked well together and everyone did their part?

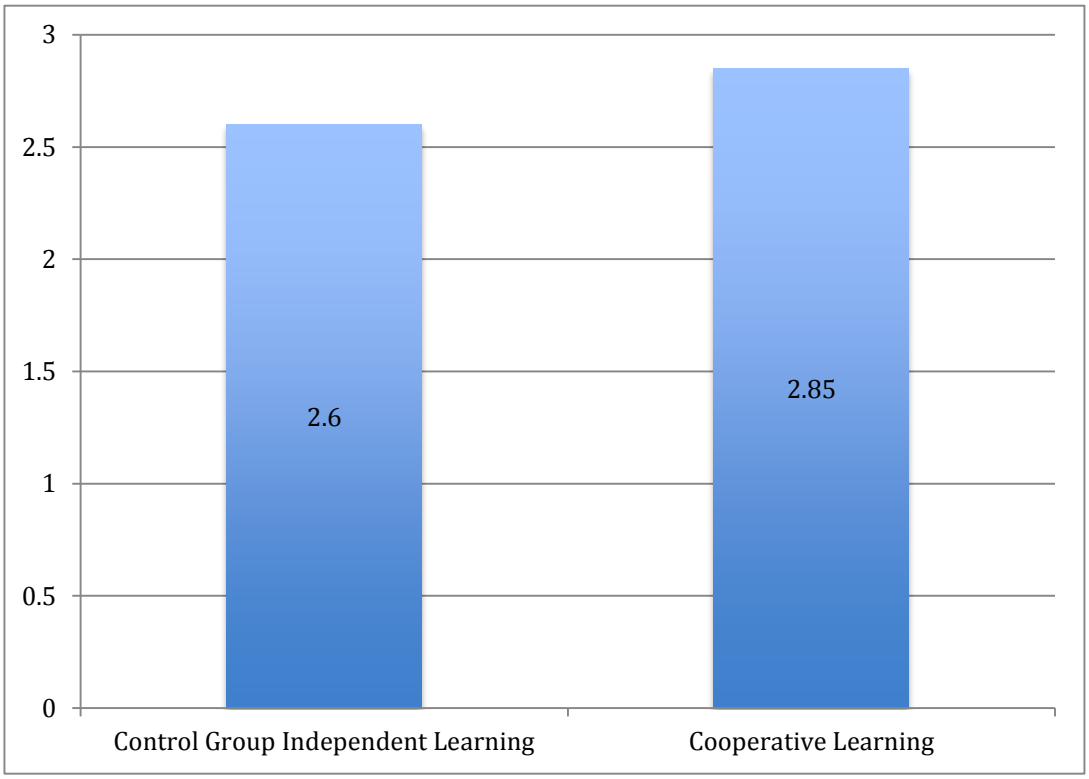


Analysis of data measuring academic success between the control group and the two collaborative groups show a ten per cent difference in class average scores on the Earth History Project. The collaborative groups combined average was ten per cent greater than that of the control group of independent learners. The grading scale used in this project is a 4-point scale where 4 exceeds proficiency, a 2.6 is a B letter grade and a 2.85 is approximately a B+.

Figure 4:

Class Average Rubric Score

Independent Learning (Control Group) vs. Cooperative Learning

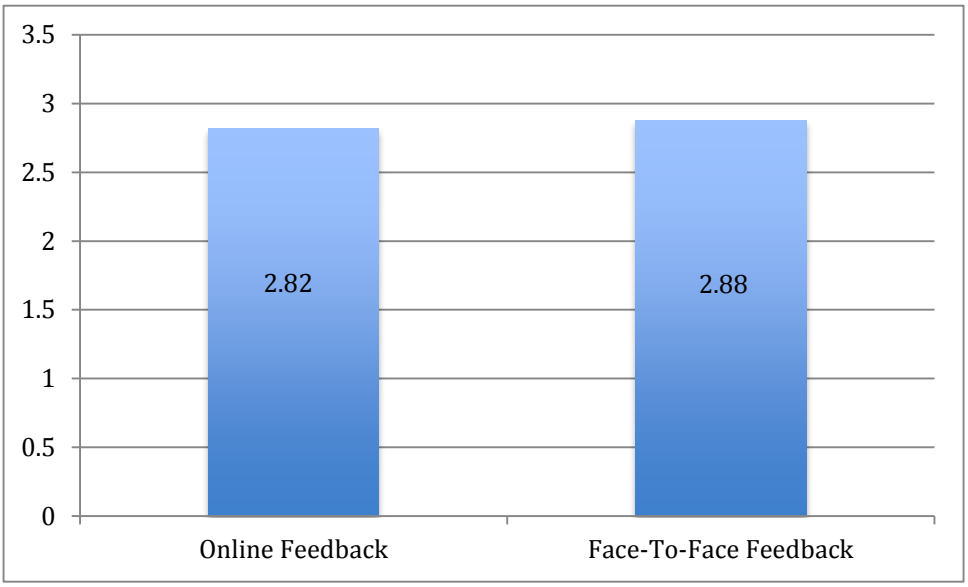


Comparing class average scores between the two collaborative groups shows a slight (2%) advantage of face-to-face feedback versus online only feedback. I believe this advantage to be so small, the data becomes useless for decision-making purposes. Therefore, when helpful I will continue to use both feedback methods in class until further research proves otherwise.

Figure 5

Class Average Rubric Score

Online Feedback vs. Face-To-Face Feedback



Other data collected during this study include observing student use of specific applications and tools for online collaborative projects. Specifics that I had hoped to discover are student preferences for apps to help improve intra-group communication, sharing individual student generated products for feedback, for presentation or publishing. Some helpful information has been collected regarding these areas but I must include that nearly all Parkway students are still not savvy internet users beyond Snapchat, Facebook, and texting.

None of these applications, however, are permitted in school. Therefore, their teachers, who are themselves not yet gifted savvy internet users, introduce students to permitted apps. This then limits students to a few familiar applications; Google Docs, Keynote, and Educreations. While these three applications are of great value in the classroom Keynote and Educreation have already become "tired" tools that no longer excite and inspire but are traditional conduits like a written report or poster. Google Docs has become our preferred method of online communication and sharing of materials, feedback, and publishing.

Limitations

To measure any differences in academic achievement between the collaborative groups and the variables being measured it has been assumed that the ability levels of all class periods are similar. I believe that it is always possible for variations to exist in average ability levels of students in different class periods. Data received therefore may be invalid for comparative purposes. Additionally, data collected reflects the results of only one academic project completed by students. Originally, the intention of this study was to collect data of the three experimental groups over two or even three academic projects thus providing more data, possibly under variable conditions, that might yield significant differences in results between groups or partial confirmation of my hypotheses.

After data analysis, class average rubric scores of the online feedback group versus the face-to-face feedback group does not appear great enough statistically to warrant a

preference between the two modes of feedback. However, anecdotal evidence (observations, feedback discussions, and interviews) I feel support a student preference for face-to-face feedback.

I have also determined that the survey method was limited in how much change could be measured in attitudes or beliefs over both the pre and post surveys. Deeper questions may be required or more specific questions developed that gather nuances in student attitudes toward collaborative learning projects.

Additionally, I have become aware of not being as internet savvy as needed to support my own students addressing the difficulty they have accessing information, synthesizing various sources, sharing with their fellow group members and then creatively publishing their synthesized summaries of their collaboration. For most of my students as well, the interest and desire to engage is limited by their inexperience using iPads and available applications. Lacking enough familiarity with the choices available to students online has created, at times, confusion and subsequently a gulf between a students desire to engage in online practices and their low skill level at satisfying the requirements of the project in a creatively novel or fulfilling method. Subsequently, this has impacted their attitudes and beliefs at the usefulness of collaboration and engagement in future tech savvy projects.

Future Action Plan

Traditional Montessori classrooms require a prepared environment that is supportive, community based, and allows students regular opportunities to develop as independent learners. I plan to continue my research and develop improved supports for collaborative learning opportunities that deepen a student's capacity to participate fully in our learning community and as members of society. To be faithful to the spirit and teachings of Maria Montessori I must also explore the use of technology to go beyond the community and follow the child creating opportunities for individuals to focus on their own interests.

To be fair and impartial, I will continue the practice of supporting student collaborative projects building skills, feedback loops and student methods of tracking progress and include the experimental group as one of the collaborative groups in the next collaborative project. Thus, allowing them the opportunity to build their collaborative skills and a chance to elevate their attitudes toward collaborative learning opportunities.

I would like to continue to compare the effectiveness of face-to-face feedback and online feedback. Continuing this will most likely help create improved tools for online feedback that may again minimize any differences between the effectiveness of the two modes of feedback. If the tool is improved, great news for us, better instruments to measure student achievement. Other tools that I would like to develop further are the pre and post survey gauging student attitudes regarding collaborative learning. I plan

on continuing to research the questions others have developed and create more probing questions that will measure attitudes with greater specificity.

Regarding my level of internet savvy I plan to enroll this summer in several opportunities for professional development that will support improvement in my iPad teacher skills, help me to better integrate activities with technology and help build "internet savvy" capacity in all of my students.

Lastly, I would hope to share with my colleagues all tools, insights, and findings created and generated during this research project.

Discussion and Conclusion

Research shows that collaborative projects increase student success and engagement when groups are supported and adjustments are made to improve student attitudes and beliefs toward collaborative learning. Goals for this study were to find evidence for increasing the use of collaborative learning in Science class based upon improvements in engagement and academic performance. Through this study I have discovered supports that improve group functioning and academic success. I have also begun to harness the creativity and enthusiasm students have for technology and social media, sparking greater student participation and academic improvement. While the evidence collected during this study by itself is not enough to support increasing the use of

collaborative learning in my classroom, the research of others, continuing to research on my own, and Parkway's adoption of one to one iPad's are enough evidence and motivation to support increasing the amount of class time in supported collaborative learning.

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Appendix A-

Pre and Post Survey- Student Attitudes and Beliefs about Collaborative Work

Survey Questions
Student Attitudes and Beliefs Toward Collaborative Projects

Do you like working with other students on group projects?

not really
sometimes
yes, I wish we could do it more often

When working with a group at school on a project, which of the following is most helpful about group work?

sharing the work
getting help on the parts I do not get
being the leader
talking with each other about ideas for the project
talking about with each other about things other than the project

When working with a group would you rather have one leader or share leadership among all groups?

pick one leader
rotate leader so each group member gets a chance to lead
shared leadership among the whole group

If you think about your past experience working in groups at school do you think that every time you have worked in groups that someone has done more work than others?

always
most of the time
half the time
some of the time
never

When working with groups at school on a project, which of the following is the biggest problem for you with group work?

not getting along with someone in the group
I always have to do more than others so that the work gets done
someone has to do more than others so that the work gets done
I am not as good at some things as the other students

Thinking about your past participation in group work are you more likely to be someone that does … (complete the statement with a choice from below)

their share of the work

more than their share of the work
less than their share of the work

Have you ever been in a group at school doing a project where you though it worked well and everyone did their part?

all the time
most of the time
half of the time
some of the time
never

When asked to do a group project how often does the teacher allow you to pick your groups?

always
most of the time
some of the time
almost never

If you get to pick the members of your school project work group, how often does your hand picked group perform well on the project?

always
most of the time
some of the time
never

If your teacher picks the members of your school project work group, how often does your teacher picked group perform well on the project?

always
most of the time
some of the time
never

Appendix B- Student Daily Engagement Log

Name: _____
Block:_____

YOU ARE THERE TIMELINE: Participation Log

Did not participate in the task or activity.

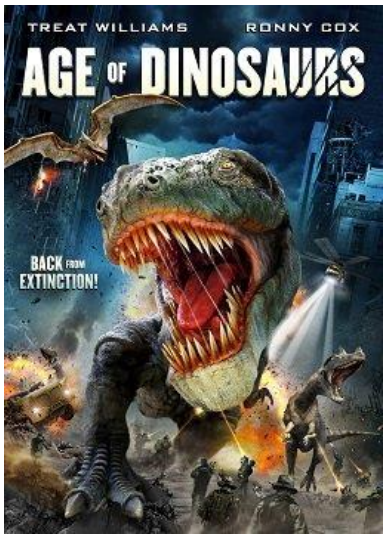
Went above and beyond in effort and contributions.

Date	Participation Score	Reasoning or Justification

Appendix C- Group Project Description- Earth History Timeline Online

Name:_____

YOU ARE THERE- EARTH HISTORY TIMELINE ONLINE!



During this group project you and your team of three will create an online presentation of earth history. Included in this history will be facts that describe changes in Earth's atmosphere, water, climate, life, and geological events that changed earth surface of the past 4.5 billion years.

In this project your group will show us all that you can read rock layers and interpret some of the events of each period in Earth's history- what was living, conditions of environment, and physical changes to the surface of our planet. You will explain to us the known facts and the evidence that supports what we know so far about what has happened right here on EARTH.

This project could be in the form of a timeline, a report, a slide show, or other online product that is creative, interesting to YOU and approved by your teacher.

You must include evidence used to describe each era and period in Earth History:

- Infer age and extinctions using index fossils of known rock layers
- Environmental conditions by examining the types of rocks formed of the time
- Include in your timeline images, videos, tables, charts and or graphs

Project must include all eras and the Pre-Cambrian time period:

- Each era must contain predominate life forms and major geological events that the era is most recognized for.

Project must include all periods

- Each period must contain predominate life forms and major geological events that the era is most recognized for.

Demonstrate an understanding of
Superposition
Uniformitarianism
Correlating the order of rock layers.
All vocabulary recommended

Standards to be Addressed in this project

-Interpret successive layers of sedimentary rocks and their fossils to infer relative ages of rock sequences, past geologic events, changes in environmental conditions, and the appearance and extinction of life forms.
-Explain how the fossil record documents the appearance, diversification and extinction of many life forms.
-Recognize that extinction is a common event and it can occur when the environment changes and a population's ability to adapt is insufficient to allow its survival.
-Relate rock composition and texture to physical conditions at the time of formation of igneous, sedimentary and metamorphic rock.

RUBRIC of required elements to be included in your Timeline Project- YOU ARE THERE

Element	4- Extraordinary	3 Proficient	2 Key Element Missing	1 More than one key element missing
Contains all elements of project each era and period	Contains all elements of project each era and period represented in excellence	All elements represented and meets expectations	One element missing all other elements meet expectations	More than one key element missing other elements meet expectations
Environmental conditions at the time and evidence	All evidence of the conditions interpreted accurately from rock record in excellence	All evidence of the conditions interpreted accurately from rock record	One piece of evidence missing or inaccurately represented.	One or more piece of evidence missing and/or inaccurately represented.
Life at the time And evidence	All evidence of the conditions interpreted accurately from rock record in excellence	All evidence of the conditions interpreted accurately from rock record	One piece of evidence missing or inaccurately represented.	One or more piece of evidence missing and/or inaccurately represented.
Demonstrates understanding of index fossils, superposition, correlating rock layers, vocabulary	All elements represented: index fossils, superposition, correlating rock layers, vocabulary in excellence	All elements represented: index fossils, superposition, correlating rock layers, vocabulary	One element missing either, index fossils, superposition, correlating rock layers, vocabulary	More than one element missing either, index fossils, superposition, correlating rock layers, vocabulary

Images, video, graph, chart, table	Multiple images and one of either video,graph, chart or table represented in excellence	Multiple images and one of either video, graph, chart or table	Multiple images and none of either video, graph, chart or table, or very few images	Few images and none of either video, graph, chart or table, or very few images

Appendix D- Group Feedback Form

YOU ARE THERE!
EARTH HISTORY TIMELINE ONLINE

Group Feedback Form

Progress to _____

Areas to improve on project work

Areas to improve group functioning

Individual Feedback

_____

_____

_____

_____

Appendix E-
Group Role Support Sheet

1. **Group Leader**
    1. Reads all directions to group
    2. Leads the discussions
    3. Checks the data sheet
    4. Helps with clean-up
    5. Is the only one who can ask a question of the teacher

Materials Manager

1. Is responsible for collecting and returning all materials & supplies to the appropriate place(s)
2. Is the only one who can get up for materials and supplies
3. Makes sure the everyone in the group has equal access to the materials and supplies
4. Checks the data sheet
5. Helps with clean-up

Time Keeper

1. Holds the team stopwatch (or watches the clock)
2. Keeps group on task and reminds them about time
3. Is responsible for getting the group to finish on time
4. Checks the data sheet
5 Helps with clean-up

Data Collector

1. Collects the data for the activity
2. Records data on the appropriate form or sheet
3. Returns data sheet to teacher and/or records group data on class data sheet
4. Makes sure all other team members check the data sheet 5. Helps with clean-up

Appendix F- Group Progress Tracking Report

Name:	Day1	2	3	4	5	6	7	8	9		
Contribution to Group Goals											
Consideration of Others											
Contribution to Knowledge											
Working and Sharing with Others											
Quality of Work											
Score= Total of all points divided by 5										Average Score During Project= Total points divided by 9	___

Category	4	3	2	1
Contribution to Group Goals	Consistently and actively works toward group goals, willingly accepts and fulfills individual role within group	Works toward group goals without occasional prompting accepts and fulfills individual role within group	Works toward group goals with occasional prompting	Works toward group goals when prompted
Consideration of Others	Shows sensitivity to the feelings and learning needs of others, values the knowledge, opinions, and skills of all group members	Shows sensitivity to the feelings of others, values the knowledge, encourages the participation of others	Shows sensitivity to the feelings of others	Needs reminders to be sensitive to the feelings of others.
Contribution to Knowledge	Consistently and actively contributes knowledge, opinions, and skills without prompting or reminding	Contributes knowledge, opinions, and skills without prompting or reminding	Contributes information to the group with occasional prompting and reminding	Contributes information to the group only when prompted
Working and Sharing with Others	Helps the group identify necessary changes and encourages group action for change, does assigned work without reminders	Willingly participates in needed changes, usually does the assigned work and rarely needs reminding.	Participates in needed changes with occasional prompting, often needs reminding to do the assigned work .	Participates in needed changes when prompted and encouraged, always or often relies on others to do the work
Quality of Work	Extra work put into assignments, all criteria met for assignment based on rubric expectations	Some effort into all parts of assignment, criteria met for assignment based on rubric expectations	Little effort put into some parts of assignment, criteria was not met for some assignment based on rubric expectations	Work done in a rush. Failed to follow rubric expectations for assignment.
Score= Total of all points divided by 5	___			

Group Progress Tracking Report
Rubric of Group Expectations