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Project Based Learning: Assessing and Measuring Student Participation

Bethany A. Clark
bethany.tallman8@gmail.com

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University of Nebraska - Lincoln

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Abstract

This paper includes a literature review exploring the major components of project-based learning (PBL) followed by an analysis of research conducted in a classroom utilizing project-based learning concepts. The literature review includes an in-depth look at terminology and elements to be included in PBL projects and how PBL differs from traditional classroom projects. It also discusses assessment techniques and the benefits on students of implementing PBL. The focus of the review is on the idea that with more student control over their own learning, the more motivated students will be to complete and succeed. With student influence and participation at the core of PBL, the curriculum research was used to determine if students with different propensities for learning are in fact more willing to participate and perform at a higher level. The research component includes the PBL methods that were used and changed throughout a semester and if the use of PBL in a classroom had any significant effect on student participation and success.

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Introduction

Traditionally, the standard of measurement for learning in our school system has been placed on objective problems and solutions where the teacher gives a problem to solve that can be answered with one solution. These problems are counted as either wrong or write depending on if the student reaches the same solution as the teacher expects. This customary classroom set up includes lectures given by teachers followed by learning activities undertaken by students, and at the end of a given unit of study: a test mainly structured around recall and recognition. Sometimes, the test is followed by or replaced with a project, group or individual, where students follow strict, teacher-created guidelines on the given topic over a few days. Whether selecting the end of unit project, test, or both, they are assessment tools that follow learning (Markham, 2011). Project-based learning (PBL) transforms this traditional way that learning occurs in the classroom.

According to Warren (2016), with PBL, students "manage their own acquisition of learning" (p. 34) and learn key concepts while creating their project. With this, he points out that this completely alters the relationship between students and teachers, giving students more control and ownership while teachers become facilitators. Beyond the shift in how learning occurs, PBL projects are completed over longer periods of time and cover multiple curricular standards. The projects could potentially have many different solutions that are reached in a variety of different ways making the outcomes vary from group to group (Hickey, 2014). The creation of rubrics, reflections, peer- and self-evaluations, and any other assessment tool has to be carefully crafted. They need to give students autonomy while ensuring that there are still measureable criterions that can be used for a grade. PBL also puts a major emphasis on the idea

of acquiring 21st century skills (Warren, 2016), where students build transferrable soft skills that are sought after in higher education and the workforce.

The following literature review discusses the major components of PBL and how it differentiates itself from a traditional classroom project. It looks at the different ways that assessments can be done with such an extensive project that can have many different solutions. The literature review acknowledges the many benefits that PBL can bring to the classroom and to individual students.

Based on the extensive examination of literature on PBL, I conducted a research study utilizing many of the principles involved in PBL. The second half of this paper focuses on the actual study of the use of PBL concepts in a classroom where projects are at its core. The classroom that was chosen is one where content is created for a video scoreboard where students are aware that their final product is going to be viewed by many spectators. It is important in this classroom that the components of PBL be used so that students have the most control over their projects and learning so that the final products are authentically student created.

The research was done with the hope that students who have habitually performed at varying levels in the traditional classroom setting, where objective criterion are used, all perform at the higher levels because of many factors associated with the principles of PBL. In this classroom students were given criteria and deadlines for their projects but had to rely on many of the 21st century skills to complete the projects. Because they had more autonomy, students had to problem solve and work as a team to delegate more than they are used to as well as be held accountable for their involvement in the project because of the weight put on participation. This section also discusses the changes that were made from project to project in grading and participation evaluations.

Following the discussion on the research that was conducted using PBL in a classroom, the paper concludes with a reflection that examines the effectiveness on student engagement using PBL concepts. There are also considerations for the future use of PBL concepts in the classroom used in the study as well as other classrooms where there is a possibility of shifting to a more subjective, PBL based approach.

Review of Literature

Project-Based Learning

Bender (2012) sums up the fundamental meaning of PBL stating that it is "Working cooperatively to solve a problem" (p. 7). Although vague, beyond this basic meaning, there are many detailed common elements and terms that must be present in order for a project to be considered project-based learning and differentiate itself from a traditional classroom project.

Common Elements of PBL. The following components differentiate PBL projects from traditional classroom projects. These components are also important in the acquisition of 21st century skills and content knowledge that guide student learning in a PBL classroom. First, working in groups is a key factor for a project to be considered project-based learning—students must work together to solve a problem. Bender (2012) explains that when students work in collaborative groups they learn through social context and interaction with their peers. Students also increase their capacity and learning through shared cognition (Resnik, 1991).

A second element in PBL that isn't always present in traditional projects is student choice and voice. PBL projects transform the roles of both the teachers and students. Hickey (2014) reminds the reader that students must be motivated to be independent learners. He suggests that having a voice in a project is a natural motivator and makes students feel more in control of their learning. As explained by Ryan and Deci (2000), when it comes to autonomy versus control, when a person feels like their behavior is being controlled, their intrinsic motivation for that activity diminishes. A need for many classroom teachers is the aspect of control so that learning can occur in a stable environment and giving up some of that control can become a barrier for some teachers to commit to PBL. However, Bender (2012) explains that if relinquishing control is a problem, teachers can still create a project-based learning environment, just with more

parameters. In that situation, however, there needs to be a clear effort to allow students to have a meaningful choice and voice in major aspects of the project.

Technology can be an important component to PBL that is recommended be present in the project creation. Utilizing technology is a 21st century skill that is important to develop. Whether it is from using the Internet to research and gather information, using a video or image editing software, or creating blogs for reflection or collaboration, technology should be emphasized in the project. (Bender, 2012)

The fourth element of PBL, unlike many traditional classroom projects, is that projects are presented publicly in some way. This doesn't mean the project is presented solely to the rest of the class, it means that it is presented to the audience in which the problem and solution impacts. This could be a particular group within or outside of the school. Building a project and solution for an outside group and presenting it publicly also drives student motivation, where students feel a greater sense of ownership and responsibility (Hickey, 2014).

PBL Terminology and Project Descriptions. Besides the four major components of PBL there is common terminology with how the project is described and presented to students that should also be present. These terms and project description pieces are there to provide parameters and act as a reference so students stay on track. The rubrics can be used so the teacher can provide information on when students have a choice and voice and when they have to stay within certain parameters.

Bender (2012) explains that the anchor is a term used to introduce students to the overall project concept. This is a generally a one to two paragraph narrative that introduces the project or problem and is intended to create student interest. After the anchor comes the driving question, the driving question is presented; this is a main question to help students focus their research and

development so as not to get off track. The anchor and driving question should work together so students can understand what is expected of them to gather. Finally are the artifacts, or all of the materials that need to be gathered throughout the course of the PBL project. These are usually graded to some extent and may include individual or group mini projects, reflections, evaluations, and the final project (Bender 2012). Brainstorming is a great way for students to be involved in the planning stages of the project where they can assist in creating the anchor, driving question, and determine artifacts to be created.

PBL Assessment

Since solutions in PBL projects can vary and be achieved in different ways, grading can be challenging. It is important in this case to differentiate and utilize assigning formative and summative assessments or assignments, where formative assessments are conducted during learning and can focus on the process of learning and summative assessments are completed after learning has occurred (Greenstein, 2012).

By assessing the different aspects of the project and project creation--the artifacts--students have more opportunities to make up for an area they may not excel at. For example, students may have one or two individual formative artifacts to complete, one or two group formative artifacts to complete, and lastly the completed project is a group summative assessment. This way, you have measurable criteria to grade up until you get the final product. There are many resources and options teachers have to ensure students are accountable as well as motivated both individually and within their project group.

Rubrics. Rubrics play an important part in the grading of PBL artifacts. They need to be detailed enough that students understand what is desired of them once they achieve a specific

problem solution. It is also important that you share any rubrics prior to beginning an artifact. (Bender, 2012)

Creating rubrics for tangible artifacts is much easier than grading the intangible skills, such as participation and effort, for each student. As described by the Buck Institute for Education (2016), the 4 C's are major assessment areas in PBL: Creative/critical thinking, collaboration, communication, and creativity. Using rubrics makes assessing students on the 4 C's much more simplistic and objective and should be used for both individual and group grades.

Peer Evaluations. As a facilitator, the teacher doesn't always see all that goes on within a group. Giving group grades for all artifacts doesn't allow for accountability for students who take advantage of what Lim (2012) calls social loafing, where students assume that their group members will pick up their slack. Peer evaluations can also be unreliable when friends are part of the same groups. Lim conducted a study to determine what students believe their peers should be graded on. The results indicated that students find social collaboration more important than intellectual contribution, something that teachers can't easily observe. With more accountability on individuals within a group, motivation can occur naturally.

There are many ways that Lim suggests that students can grade their group members including peer nominations, peer rankings, and peer ratings. Bender (2012) adds that peer evaluations don't need to be done at the completion of a project but also can be effective if conducted throughout the process where teachers can intervene with individuals or the team if needed—helping to reduce the "friend effect". Regardless of the type of peer evaluation, Lim's study indicated how important students find that rating their peers is in PBL projects.

Self-Evaluations and Reflections. Having a student determine their own grade on a certain artifact based on a numerical scale can be very difficult when some students inflate their

grades and others are too hard on themselves (Bender 2012). However, just like with peer evaluations, self- evaluations are important as it gives students a chance to self-regulate their learning. They can therefore give teachers a sense of their feeling about their own participation. Bender suggests these be done both throughout and at the end of a project. He also advocates that doing this gives teachers an opportunity to hold student-teacher conferences to determine what their "real" self-evaluation should look like.

Reflections on the other hand can be done both individually and by groups. Having students reflect on various components of the PBL project can help develop questions students may have and create a more clear vision. For instance, students can reflect on the driving question or they can reflect on how their brainstorming session went—giving teachers a sense of understanding about where the group is headed (Bender, 2012). Warren (2016) recommends thinking of reflections in three phases: in-action (midst of action), on-action (after action), and for-action (guide to future action), where for-action allows students to think about how they can improve on the next PBL project.

Benefits of PBL

Project-based learning can seem extremely intimidating especially when it requires teachers to switch from being teacher-minded to facilitator-minded. Allowing students to have more control over their learning is a major hurdle for teachers (Bender, 2012), especially when considering the many different skill levels within their classroom along with all of the pressures of meeting state standards. PBL, however, has proven to naturally contribute to classroom differentiation by having more options for students since they can take on different roles that suit their strengths and also learn from their peers. There is also research that has found that PBL actually increases achievement scores (Bender 2012). Besides these, once a teacher or school

commits to integrating PBL into their curriculum there are many other benefits that are discussed below. (Bender, 2012)

21st Century Skills. Larmer (2016) explains that multiple research projects conducted with groups of adults including but not limited to community members, businesspeople, parents, and teachers, came back with similar results of what an ideal K-12 graduate skillset should be. He sums the results up with a student being, "A responsible, resourceful, persistent critical thinker who knows how to learn, works well with others, is a problem solver, communicates well, and manages time and work effectively" (p.66). All of these traits are important 21st century skills that can be learned and reinforced with PBL.

Larmer (2016) explains that because students are usually completing projects for the community, they learn about real deadlines because outside individuals are counting on them. Bender (2012) describes that by working cooperatively and with assistance from a facilitator, students can learn conflict management and many different types of communication styles. Also, he says that since some assessments will be based on the entire group, students learn the effects of interdependence. Since teachers work as facilitators, there is a lot of opportunity for the development of critical thinking skills. As Bender explains, teachers can use time to generate inquiry and teach brainstorming skills where students can explore the many possible solutions.

It is all of these benefits on a student's basic skillset that show the true impact of project-based learning – where students get an opportunity to both learn content but also obtain those 21st century skills in a way that resembles many situations they will face as adults. Because PBL allows for differentiation of assessment, gives students autonomy and a sense of responsibility, and prepares them with skills for their future, students have many ways to be motivated. The preparation for PBL is front-loaded (Bender, 2012) but has shown to completely transform the

traditional classroom norms and the way students learn. Out of the many concerns about student participation, especially when relinquishing so much control over learning, I intend to answer the following question: What is the impact on student participation, for students of varying performance levels in the traditional classroom, of an upgraded curriculum based on project-based learning?

Curriculum Method

This research will be implemented during a semester long course based on video and image creation, called Digital Media. The course will be introduced as a project-based learning course where students can expect to work in groups throughout many of the projects and assignments and where their final products will be publicly shown to the school during events in the gymnasium.

Procedure

As the semester begins, students will be introduced to and take part in activities to familiarize themselves with project-based learning and its expectations. Some of the important components of PBL that will be discussed prior to any projects are brainstorming, working in groups, and 21st century skills. Another important element in the course to implement prior to any PBL work, is to teach the basics of video and image editing software that will be used for many of the projects. This way, students are able to focus more on the project creation and not worry about learning the technical skills as deadlines approach.

Students will be divided into groups created by myself so that students of varying abilities are included in each group. This way students may work with peers they are not familiar with to help build those 21st century skills and possibly learn different skill sets. The arrangement of groups may change from project to project. I will introduce each project with information that includes the anchor, driving question, artifacts, deadlines, and assessment materials that include rubrics. As students move through the semester, students may gain more control over what is included in these components of the PBL project as students begin to reflect on past performance.

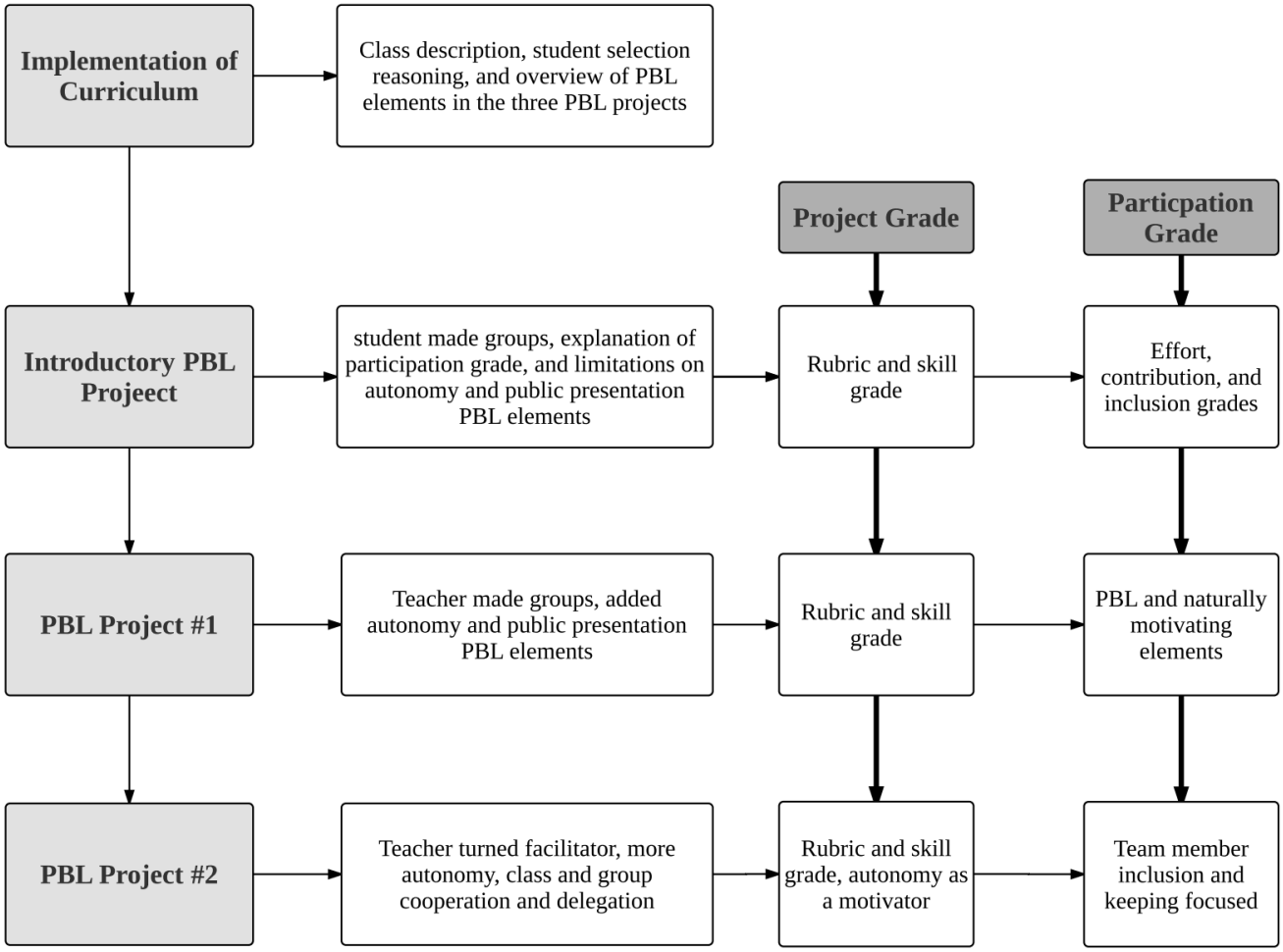
Collecting Evidence

Throughout the semester students' growth and overall performance will be documented. I intend to do this through choosing a sample size of six students that include two low-performing, two average-performing, and two high-performing students, as proven by their performance in traditional classroom settings. Evidence of the students' participation and performance will be collected as we move through the semester. Items that may be collected include: Artifacts from each project, rubrics, self-evaluations, peer-evaluations and reflections.

Evaluating Evidence

At the end of the semester, all of the evidence for all six students will be reviewed and sorted. The documents will be compared against each other to see if participation and performance in a project-based learning classroom, where students had more influence over their learning, motivated students similarly regardless of the level of performance they have displayed in the past. Documents for each student will also be compared against themselves to see if, as students familiarized and got comfortable with PBL throughout the course of the semester, they became more involved and motivated.

Diagram 1: Implementation of Curriculum Flowchart



Implementation of Curriculum Method

As part of my curriculum method implementation, it was important to select my test group of students carefully. In the digital media course, it was essential for students to learn basic skills and concepts in order to complete components of the PBL projects. The first month of the semester-long class was used to teach and reinforce basic concepts having to do with image and video creating and editing. Traditional classroom teaching of lectures and small individual assignments were used throughout many of these days and helped give me a good understanding of how my twelve students consistently perform in their conventional classes. Based on their individual work habits, I selected my two low-performing, two average-performing, and two high-performing student subjects.

All three of the PBL projects throughout the semester contained pieces of the major components of PBL – group work, technology, choice and voice, public presentation, and PBL terminology. Because I was more apprehensive about allowing students complete control during the first project, students slowly received more autonomy as the semester went on. For each project, students worked in groups of three to four to complete them. A major factor in their projects was the use of technology as students had to create their final products using film and video editing. With the exception of the first introductory project, their final product was then displayed in a public way to entertain the audiences at school sporting events. Although the final product qualifications had strict parameters, students used their own choice and voice throughout the process of the producing and editing their videos. They chose the subjects, the concepts, and had to work out their own system of delegation. Students were also given artifacts to be collected throughout the creative process to ensure they were staying on task.

Introductory PBL Project

The digital media course is made up of students in all four grade-levels in high school. For a lead-in to PBL project, I allowed students to choose their own groups. I did this to allow students to get familiar with the concepts they were learning with peers with whom they were most comfortable. A major component of their grade was participation, knowing that I would be observing and their peers would be evaluating their involvement in the projects was meant to act as one incentive to stay on task. However, a goal of PBL is to motivate students beyond just a grade, as with many low-performing students, they may not be as affected by low letter grades like the average- and high-performing students are. This is why so many of the other components of PBL become important as they may act as motivators for different students.

The first project I created acted as somewhat of a trial to determine how to measure and assess the two future projects that would be more PBL focused. What made this project different from the rest is that their work would not be as public as the other projects as well as having more strict guidelines because I wanted this project to act as a reinforcement of skills. My sample students were in groups as follows: Both above-average students working in the same group, both average students working in different groups, and both below-average students working in different groups. Looking at the final artifact based on my rubrics, as well as their participation, was important to me in this process because it gave me a way to substantiate that sometimes the final artifact grade doesn't always align with how much effort an individual student gave.

Project Grade. All of the groups that my average and above-average students were part of received "A" grades. Their projects were well thought out and followed my rubric guidelines that had a heavier weight on technical skill and use of the program tools and less weight on

creativity than future projects would. Both of my low-performing students were in student selected groups of other average to below-average students. My female below-average performing student's group received a high "B" grade. Her group followed the guidelines but didn't put as much creativity into the final product as the groups with "A" grades. My male below-average performing student's group received a "C" grade. Their final product was creative but they overlooked many of the requirements placed in the rubric that allowed me to grade their ability to use the program tools. Although the project grade reflected a more below-average grade, for my research of PBL I really focused on their involvement and interest in the projects. This is where students have that opportunity to make up for a low summative grade for their artifacts because participation looks at the actual process of creation rather than the final product.

Participation Grade. With this trial project, I observed that all of my sample students were engaged in their projects throughout the class period. My observation is important as a facilitator to ensure students are staying on task, however, it doesn't allow me to see and hear everything going on within a group project to definitively say that all group members participated equally. Therefore, along with my observation of participation, students filled out peer observation forms at the conclusion of the project. Students rated their peers on multiple benchmarks with a scale of objective, pre-determined criterion (see Appendix A). On this peer observation form was also a space to provide a rating of their own participation. As Bender (2012) pointed out, this also can't be the only evaluation looked at as many students inflate their grade or are too hard on themselves. I took all the information from my own observation, the peer evaluations, and self-evaluations to give the students a final participation grade. All students received "A" grades for participation. I saw no major discrepancies between what I had observed and what the students rated themselves and their peers.

PBL Project #1

To eliminate the possibility of evaluations being biased because group members were friends, as Lim (2012) suggests could happen, the second PBL project was made up of four teams of three students created by me. I used this opportunity to ensure each group contained at least one or two average or above-average students and one below-average student. Prior to this second project, I held a class discussion and lecture over team work and participation. I discussed and reviewed expectations, emphasizing that being a group member not only meant being involved but also being inclusive to ensure those natural leaders didn't take full control. I wanted to ensure that students were aware that I was not only looking for "social loafers" (Lim, 2012) but also for students with a more authoritative attitude.

A major difference between this PBL project and the first PBL project was that it included the component of a public presentation. Their volleyball highlight video would be shown during a set break at a volleyball game. I also added an element of competition, stating that only two of the four group's video would be shown.

Project Grade. Throughout the project work days, I observed great conversations going on between students about the overall premise of their video, the audio and music to be used, timing of the clips used, which clips to use, etc. I was impressed with my natural leaders, the above-average students, inclusiveness as well as the below-average student participation. I saw students giving suggestions on how to edit and I also saw students asking for opinions from their group members about different aspects of the projects. As the facilitator, I encouraged students to stay on task and gave recommendations on how to ensure all group members had a job. I was impressed with their delegation of the tasks that were presented within the artifacts and rubrics provided. When it came to grading the final products, all groups received "A" or high "B"

grades. As with the first project, attention to requirement details was the reason groups received grades below an "A". The two groups that received "B" grades included the male below-average performer and one of my average performing students.

Participation Grade. When it came to peer reviews, I used the same peer review concept I did with the first project. Not only did students view their own participation highly, every single student gave their peer a grade of one hundred percent. I can't pinpoint what exactly motivated students in this project as it could have been a number of factors: Using the video editing software, the participation grade weight, the idea that the project could be viewed by their peers and the community, or that I made it a competition. Because PBL contains so many naturally motivating elements, it is inclusive to so many more students because of different attitudes of extrinsic and even intrinsic motivation rather than just students who are more stimulated by getting good grades.

PBL Project #2

The final PBL project of the semester allowed students to have a little more choice and voice than previous projects. Students were now in charge of making a halftime video for basketball season. Just like the previous project, I created the groups and included at least one above-average or two average students in each group of three. For this project, students had to apply learned concepts as well as problem solve through new concepts such as how to delegate tasks, produce and film content, and edit the video to their liking. Each group had the freedom to decide what their halftime video would include, knowing that the few limitations were a two-minute time length, appropriate content, and a concept that was different than other groups.

The entire class had to cooperate together as well, as all the groups were sharing the same equipment and room. What I observed from this process was a growing classroom community

where students respected and encouraged other groups. As the facilitator, I helped with organizing and keeping a flow as students filmed their subjects, as well as giving input to their work. From my observation, I saw great communication between group members and creation and acceptance of ideas.

Project Grade. Just as with the previous PBL project, the groups came together to receive grades of "B" or higher. The one group that received a "B" grade included one of my average performing students. I observed a lot of excitement around filming and editing the clips. This was positive because it made me believe that true autonomy played a major part in this excitement. But this excitement of one part, led to neglect of certain important aspects of a good halftime video. Again, these grades don't necessarily reflect participation or effort, they only reflect following certain criteria in my artifact rubrics.

Participation Grade. As the project that most closely aligned with PBL standards, I did make one major change from the other projects. Instead of having an objective grading scale that students would rate their peers on, I decided to leave this open ended. Each student was to rate that student overall on a scale of 1-10 and tell me exactly how their group members participated and how they could have done more (see Appendix B). I had a requirement of writing at least three sentences explaining their group members' participation. This gave me better insight into how the group members felt about what was actually communicated and done between the students; those conversations and actions, or lack thereof, that I couldn't hear or see. This way I could better align what I thought I observed to what was actually going on. Another addition I made to this peer review was asking students to not only rate their own participation but also write exactly why they gave themselves that rating.

My initial observation was correct for three of the four groups. After reading through their peer reviews, I was able to conclude that the members in these three groups all gave one hundred percent effort. None of them had any negative comments about their group members' participation and they all gave many examples of how each group member contributed. The fourth group, however, had a little different feedback. The group was made up of one of my high-performing student subjects and both of my below-average performing students subjects. One of the below-average performing students received great reviews from his peers and was given a one hundred percent. I did have a small participation issue with him on a short partner project where he admittedly said that his partner, in that case, "did most of the work". He may have seen how much participation affected his grade and tried harder during this PBL project. The other below-average performing student subject was given a little lower review by her peers. Written about her was that she participated great until the final day where she stopped giving input. I observed this also, and gave that student a "B" grade. Finally, my above-average performing student received a high "B" grade. Although my observation as that she was helping a lot, one of her group members wrote that she wasn't very accepting of other ideas due to a more authoritative attitude. It may have been a hard self-realization for this particular high-performing student because she still gave herself an "A" for participation. In this case the peer review became very important to help me as the teacher give her a grade that was more reflective of how she worked with her other group members.

As I worked through the PBL projects, I added more elements of typical PBL projects, including more public presentations and more choice and voice. As a way to measure if students participate in these projects, and a large part of their grade, were the peer review and self-evaluations. The small changes I made to promote more elements of PBL throughout the projects

gave me more clarity on what could actually perpetuate average to above-average grades from students at all performance levels. Table 1 (below) includes a summary of all of my student subjects that has their grades received on each of the three projects for both the final product and their participation. What you can see from this table is that students at all performance levels were actually receiving average to above-average grades.

Table 1: Final product grades and participation grades.

	Introductory PBL Project Product Grade	Introductory PBL Project Participation Grade	PBL Project #1 Product Grade	PBL Project #1 Participation Grade	PBL Project #2 Product Grade	PBL Project #2 Participation Grade
Above-average Student 1	A	A	A	A	A	A
Above-average Student 2	A	A	A	A	A	B
Average Student 1	A	A	B	A	A	A
Average Student 2	A	A	A	A	B	A
Below-average Student 1	B	A	A	A	B	B
Below-average Student 2	C	A	B	A	A	A

Discussion and Teaching Implications

After creating and implementing a project-based learning curriculum in my digital media classroom, I consider there to have been many successes with evaluating and improving student participation. I chose to make some minor changes from project to project that better allowed me to assess student participation during the projects and I also believe there can be some changes made in future classes to have an even more effective PBL classroom.

Participation Motivation

As we moved from the initial introductory PBL project to the final PBL project of the semester, more elements of PBL projects were added. With a new classroom of students, I believe this is something that I would not change in the future. Getting students familiar with the PBL terminology and the importance of participation in my classroom was supported by limiting some of those elements in order to assess their ability as a class and individuals to handle more independent learning. Once I knew they were able to handle self-directed learning and understood my expectations as a facilitator, I felt comfortable allowing students to use their time appropriately and to take responsibility for the grade they received on their project and with their participation and effort.

Participation Grades. For most average and above-average students in my class, I learned that many were much more motivated by the grade they received than the below-average performing students. Getting to know my below-average performing students, I determined that there was motivation for simply a passing grade rather than an above-average grade. I reiterated the importance of participation and the weight it had on their final grade throughout every project to motivate students to obtain a better grade. For those less motivated by grades, I left it

up to the many components of PBL that almost certainly play a role as motivation to participate in the project.

As students were able to gain more control over their projects with brainstorming and creativity, I observed a lot of involvement from all of my students. It is clear that some students were more hesitant to give input over others but they still were present and active in the process. Students in these PBL groups were able to find their strength and interest and use that to contribute to the group. Some focused on the more technical side of the project, editing and searching for clips or audio, while others were more involved in formulating ideas. I found that letting them know that it is okay to utilize strengths and have others make up for weaknesses or disinterests was a great way for students to not get discouraged if they felt like they were not contributing in a particular step.

In order to account for differing interests and participation, I decided to make a major change to the peer review between Project #1 and Project #2. I asked students to give their group members a single participation grade but then instead of using a scale, I asked them to record what those group members actually contributed. If they gave a group member anything less than a perfect score, they also needed to record how the group member could have contributed more. What I noticed by using this type of peer review, was that students were a lot more honest about what was going on in their group. I also believe it made the reviewer more accountable for the grade they were giving their group members because they were required to really consider the effort and contributions their group members made or didn't make and how that could affect the outcome of their project.

Just as with the previous peer reviews, the new peer review asked students to also self-evaluate by rating themselves. But unlike the first two project peer reviews, Project #2 review

did not just require them to rate themselves on a scale, but also asked them to explain why they gave themselves that rating. I found what Bender (2012) said to be true about students being too hard on themselves. Students seemed to both give themselves a lower grade than their group members and also reveal an extremely honest side of themselves. In my research implementation, with this particular self-evaluation, I never felt as though students used the opportunity to inflate their grade, especially when I compared it to what I observed and how their group members reviewed them.

In the future, I would choose using an open-ended self-evaluation and peer review. It makes students more accountable for their participation and helps them reflect on what their group members really contributed to their final product. One element I would choose to change in future implementations of PBL inspired projects is to, as Bender (2012) suggested, evaluate student participation throughout the project creation. Since PBL projects tend to extend over multiple weeks, I think asking students to evaluate themselves and their peers once every week could influence more students to participate, especially if that participation weighs heavily on their final grade like it did in my classroom.

PBL Elements. Even though some students aren't extrinsically motivated to participate for a grade, I believe a lot of the other elements of the PBL model assisted in the effort my students put forth that contributed to their above-average grades for participation. The added autonomy throughout my projects, the ability to use technology, and the public presentation of many of the final products all could have contributed to intrinsic student motivation. Just like with grades, some elements could have influenced some students more than others but a mixture of all these motivating factor and grades could have accounted for the high levels of participation in my class.

As students moved from project to project, they were slowly given more autonomy and my role shifted from teacher to facilitator. Besides getting my approval of topics, as the facilitator I was there mainly to help answer questions, ensure students were on task, and give suggestions and encouragement. As Ryan and Deci (2000) explain, all people have an internal need to feel autonomous and competent. By allowing students to have more control, rather than feel controlled, it very likely can add to intrinsic motivation. Since my students were able to select topics, produce, and edit content without me micromanaging every decision, it may have given students a perception of being more independent and therefore increased motivation.

As students become more and more technology-focused and involved, it seems only natural to implement this notion into the classroom. My research implementation was done in a course called digital media, which implies in the name that the class is digitally based and the use of technology is frequent. Ryan and Deci (2000) point out that anything that intrinsically motivates a student must also be intrinsically interesting to them. Because technology serves as an interest to many students it could have also provided some form of intrinsic motivation for students to participate in my class.

Finally, PBL encourages the idea that final products are somehow presented in a public form. In the case of the final two projects, student projects were presented to the attendees of the school basketball games on our video scoreboard. Many parents, community members, faculty members, and peers attend these games. The creation of something purely for a grade is so routine to students that they may not put as much effort into the final product. However, knowing that a public audience is going to view the product could have definitely contributed to the motivation students had to participate and put forth good effort. From general reactions given by my students, the expressions of excitement and nervousness about the nights their projects would

be broadcast was a good indicator, to me, about being conscious of how someone else, besides just a teacher, would perceive their work.

Does the PBL Model Increase Participation?

In my experience, the many elements that make-up a PBL project are all part of different motivating factors for students. All of my student subjects, regardless of their grades and efforts in a traditional classroom, proved to excel in participation. Students in my class were motivated by using PBL through some element or a mix of a few of them, whether it was extrinsic motivation of a grade or intrinsic motivation from having more autonomy and control, using technology frequently, or knowing that their projects would be viewed publicly.

The content of my digital media class does deviate from core classroom curriculum due to its more technological nature. I realize there can be some clear differentiation between how a student participates in one class compared to digital media. I am confident, however, that PBL allows students to capitalize on their strengths as well as learn from others. PBL gives them an opportunity to take control over their learning and be motivated by more than just a grade.

APPENDIX A

Self-Evaluation and Peer Review with Objective Criterion

Self- and Peer Evaluation

Peer Reviewer:			**Peer:**		
Rate your participation on a scale of 1-5	1	2	3	4	5

Rank your peer on the following items using a scale of 1-5. For any score of less than 5, write reasoning in the space provided. Remember, all other grades for this project are group grades so if you don't feel as though a person contributed enough, this is the place to inform me.

Assisted with idea development and problem solving	1	2	3	4	5
Gave positive (rather than negative) criticism or suggestions	1	2	3	4	5
Accepted positive criticism or suggestions	1	2	3	4	5
Gave best effort in assisting with the project	1	2	3	4	5
Overall: Was helpful and positive	1	2	3	4	5

Other Comments:

APPENDIX B

Open-ended Self-Evaluation and Peer Review

Reviewer:

On a scale of 1-10 with 10 being extremely involved, how would you rate yourself? _____

Explain why you gave yourself this rating.

Group Member 1:

On a scale of 1-10 with 10 being extremely involved, how would you rate this group member? _____

Write at least 3 sentences about what this group member did during the creation of your product.

Write at least 3 sentences about how this group member could have contributed more.

Group Member 2:

On a scale of 1-10 with 10 being extremely involved, how would you rate this group member? _____

Write at least 3 sentences about what this group member did during the creation of your product.

Write at least 3 sentences about how this group member could have contributed more.

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