

Evaluating the effectiveness of ‘learn through play’ teaching method as compared to traditional in-class lecture: testing of environmental education activity manual

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Brief History on Parque Municipal Summit

Parque Municipal Summit was started by David Fairchild in 1923, it was set up with the purpose of introducing tropical plants to assess their viability to grow in Panama for agricultural. As the time passed, the purpose of Parque Municipal Summit slowly evolved, from providing US military with plants in 1940 to rescuing its first animal in 1958. In 1985, Parque Municipal Summit finally landed back into the hands of the city of Panama, which was then declared a botanical park, wildlife refuge center and a recreational park. Today, due to its richness in biodiversity, Parque Summit Municipal is the perfect place for education, recreation and conservation, to which it is dedicated to.

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Executive Summary

Environmental Education was officially termed in 1960s, the aim of it is to educate a generation of citizens that would appreciate and understand the environment as a whole. Consequently, the topic of integrating Environmental Education into school systems have been increasingly important since then. However, since each country is different, the method of integrating Environmental Education into school systems should be done designed uniquely to fit the culture of the country. The Republic of Panama introduced Ley 10 de 24 de junio 1992, that stated the introduction of Environmental Education into their school system, the subject would be addressed by integrating it into different subjects. Since then, Panama in conjunction with other organizations have put an incredible amount of effort in developing environmental education workbook. By 2014, Panama updated its law to Ley 38 de 2 de diciembre 2014 stating that Environmental Education is now compulsory to be taught in all public schools.

Parque Municipal Summit started in 1923 and had the purpose of experimenting the viability of growing native and introduced plant species for economical, ornamental, medicinal and agricultural uses. Today it has evolved into a botanical park, wildlife refuge center and a recreational park. Parque Municipal Summit thus serves as a perfect place for education, recreation and conservation.

So how can Parque Municipal Summit play a role in boosting Environmental Education in Panama? Although Parque Municipal Summit has the facilities and wealth of resources to promote Environmental Education in Panama, at this instance it does not have the required teaching materials to educate the children about the environment. Sñr. Rafael Gomez, our previous supervisor identified the lack of learning in the park, and thus proposed to have an activity book that encompassed Environmental Education that fits the park.

We began our project by coming up with environmental topics that relates to Parque Municipal Summit. Some examples of the topics include, taxonomy, animal behaviour, insects mouthparts, and so on. With this at hand, we discussed with Sñr. Rafael which topics would fit what grade, and then proceeded to designing a variety of activities. During this process, we had multiple sessions with Sñr. Rafael to determine whether the design of activities were appropriate. In total we designed 8 activities that ranges from Grade 3 to Grade 8.

In addition to designing the activities, we were also interested in seeing whether the design of these activities would help with children's learning of the environment. To do this, we selected our 'Bamboo Walk' activity to be tested on grade 4 children. We compared the learning between two groups, one group which will receive the teaching and activity outdoor while the other group would receive the lecture on bamboo in an in-class setting. From literature search, we found that 'learn through play' is a method of learning where children could make sense of their environment and learn through the act of playing. Furthermore, there has been many studies stating that play increases creativity in children, teaches them social skills and so on. On the other hand, traditional in-class learning refers to in-class setting in which teachers present a lecture to students without requiring them to move around. From this we hypothesized that the group that would 'learn through play' would be more engaged with learning than the group that will receive in-class lectures.

Moreover, we also wanted to see the difference in students learning between private and public school. To do this, we worked with grade 4 children of Colegio Brader (private school) and Escuela Omar Torrijos Herrera (public school). In both schools there was two groups that received the activity by 'Learn through play' method while one group did the traditional in-class lecture. For the 'Learn through play' group, we took the class to an outdoor setting and had the children sit in a circle, we then selected students to read about the

background information and then discussed the uses of bamboo. After that, the children did the drawing activity where they drew different uses of bamboo, and then did the Tinikling Dance (traditional Filipino bamboo dance), at the end of the lesson, the children then wrote a summary of what they learnt that day. On the other hand, for the traditional in-class lecture group, we selected students to read the background information and then discussed the uses of bamboo, right after that the students then wrote a summary of what they learnt.

To determine whether the students were engaged in learning, we did two methods of evaluation. First by observation and second by identifying the contents of information from the summary they wrote at the end. From the summaries we collected, we selected a few summaries and divided them into two categories, 'incomplete text' and 'informative text'. The 'incomplete text' are selected based on the fact that there were little to no information regarding what they learnt. While 'informative text' are selected due to the incredible amount of information noted.

We found that the 'learn through play' method was not effective for students as we hypothesized. It was found that there were significantly more 'incomplete text' in groups that did 'learn through play' while more 'informative text' in groups that did traditional in-class lectures. There are a couple of factors that could have influenced this. First, in an outdoor setting, the heat and acoustics of the environment could have lowered students ability to focus. Secondly, the students may have already to be conditioned to associate classroom to learning while outdoors to fun.

To compare the learning between private and public school, we found that there were more 'informative text' in public school as compared to private school. However, we noticed that the summary done by the private school was portrayed in a more creative manner through drawings, colours and extra information. Whereas, the summary done by private school was based more on the uses of bamboos that was taught to them.

In conclusion, the results we receive was not what we hypothesized. 'Learn through play' method of learning did not show that the students were more engaged in learning. However, we realised that our method of evaluation may not be the best way to determine students learning. Additionally we only tested the students once after the activity, it would therefore be interesting to do a follow up test to see how much the students remember. But we were not able to do this due to time constraint. We therefore recommend that future PFSS students could follow up with the testing of other activities and perhaps a different way of evaluation, to improve on the activities that have already been designed.

Resumen ejecutivo

Educación ambiental existe oficialmente desde los años 1960s y su objetivo es educar una generación de ciudadano para que aprecian y comprenden el medio ambiente. Desde, la integración en las escuelas de la educación ambiental un tema que tiene cada vez más importancia. Sin embargo, ya que cada país es diferente, la integración de la educación ambiental en el sistema educativo se hace de manera diferente según la cultura de cada país. La república de Panamá aprobó el proyecto de ley 10 de 24 de junio 1992, que describe la manera de introducción de la educación ambiental en el sistema educativo. Los temas ambientales son discutidos en los diferentes temas pedagógicos. Desde, el gobierno Panamá, con la ayuda de otras organización, trabajo muy duro para el desarrollo de un libro de trabajo sobre el tema del medio ambiente. En 2014, Panamá aprobó el proyecto de ley 38 de 2 diciembre 2014 quien afirma que la educación ambiental es obligatorio en todas las escuelas públicas.

Parque Municipal Summit existe desde 1923. Al principio, la intención de sus fundadores era la introducción de especies de plantas exóticas para usos ornamental, médico y agrícola. Hoy en día, este lugar es un jardín botánico, refugio de animales y parque recreativo. Por eso, Parque Summit es el perfecto lugar para la educación, la recreación y la conservación.

¿Entonces como es que Parque Municipal Summit puede tener un impacto sobre la promoción de la educación ambiental? Aunque Parque Summit tiene recursos y atracciones para promover la educación ambiental en Panamá, no posee mucho material para educar los niños sobre el medio ambiente. Sñr. Rafael Gomez, nuestro antiguo supervisor propuso la creación de un cuaderno de actividades sobre el medio ambiente para remediar a la falta de aprendizaje en el parque.

La primera etapa fue de escoger temas ambientales asociados a Parque Municipal Summit. Algunos de los temas son la taxonomía, el comportamiento animal, la fisionomía de los insectos, etc. Después, hablamos con Sñr. Rafael de cuales edad serian apropiados para cada tema y procedimos a la creación de las actividades. Recibimos mucha ayuda de Sñr. Rafael durando la creación de estas actividades. Al final, crearon 8 actividades para estudiantes de Grado 3 a Grado 8.

Además de crear actividades, queríamos saber si nuestra actividades ayuda los niños para aprender mas sobre el medio ambiente. Seleccionamos una actividad, 'El Bambu Paseo' para examinar su efecto sobre niños de grado 4. Comparamos el aprendizaje de dos grupos de niños, un grupo que recibiría la lección sobre el bambu en el exterior con actividades divertidas y otro grupo que recibiría la lección en la clase sin hacer las actividades divertidas. El aprendizaje a través del juego, según nuestra busqueta bibliográfica, es un método de aprendizaje que permite que los niños comprenden su medio ambiente y aprenden en el mismo tiempo que juegan. Además, muchos estudios afirman que el juego aumenta la creatividad y ayuda los niños a desarrollar sus habilidades sociales. Otro método de aprendizaje es el aprendizaje tradicional en una clase con un maestro sin actividad que requiere movimiento. Nuestra hipótesis esta que los niños que aprenden a través el juego van a ser mas motivado para aprender que los niños que aprenden en una clase.

También queremos examinar la diferencia entre estudiantes de una escuela "privada y una escuela pública. Entonces trabajamos con maestros y estudiantes de Colegio Brader (escuela privada) y Escuela Omar Torrijos Herrera (escuela pública). En cada escuela, dos grupos de niños de cuarto grado hacen la actividad con el método de aprendizaje a través del juego y un grupo hace la actividad con el método de aprendizaje tradicional. Para los grupos

que aprenden a través del juego, los estudiante aprenden en el exterior de la clase sentado en un circulo. Algunos estudiantes leyeron información básica sobre el bambú y hablamos de los usos del bambu. Despues, los niños hicieron una actividad que les pedia dibujar diferente cosas que pueden fabricarse con bambu. Los estudiante también hicieron una baile tradicional Filipino con palos de bambu que se llama "danza tinikling". Al fin de la leccion, los niños escribieron un resumen de lo que aprendido este dia. Para el grupo de estudiantes que aprendieron de manera tradicional, alguna estudiantes leyeron la información basica sobre el bambu y hablamos de los usos del bambu. Los estudiantes escribieron le que aprendido antes de hacer las actividades de dibujo y de baile.

Para determinar si los niños fue motivado para aprender, utilizamos dos métodos de evaluación. El primero está la observación de los niños durante su aprendizaje y el segundo esta la evaluación de los resumens que los estudiantes escribieron al fin de la actividad. Identificamos los resumens que pertenecen a la categoría "texto incompletos" y otros resumens que pertenecen a la categoría "texto informativos". Los "textos incompletos" son elegidos cuando el estudiante no escribió mas información sobre lo que aprendió. Los "textos informativos" son elegidos cuando el estudiante escribió mucha información.

Encontramos que el aprendizaje a través del juego no es mas eficiente que el aprendizaje tradicional. Resulta que había mas "textos incompletos" en los grupos que aprenden a través el juego y mas "textos informativos" en los grupos que aprenden en la clase. Algunos factores pudieron influir esto resultado. Primero, el exterior no es un lugar apropiado para aprender porque hay mucho ruido y hace mucho calor. En segundo lugar, los estudiantes son propensos a asociar la clase con el aprendizaje y el exterior con el placer.

Para compartir el apendizajes entre las escuelas privada y publica, vimos mas 'texto informativo' en la escuela publica que la escuela privada. Sin embargo, nos dimos cuenta que el resumen de los niños en la escuela privada estaban mas creativo porque hay muchos dibujos, colores e información adicional. Mientras, el resumen de los niños en la escuela publica hay más información sobre los usos de bambú, que fue enseñado a ellos.

En concluye, el resultados recogimos no apoyó nuestra hipótesis. El método de aprendizaje a través del juego que no demostró que los niños participan. Sin embargo, nos dimos cuenta de que nuestra método de evaluación puede no ser el major método para evaluar aprendizaje de los niños. Además, solamente probado los estudiantes una vece después la actividad. Sería interesante para probar despues una semana. Tal vez los niños pueden recordar más. Pero no hemos podido probar esto porque no tuvimos tiempo. Por lo tanto, sugerimos futuro estudiantes de PFSS de hacer el seguimiento de la pruebas y diferente forma de evaluación, para mejorar este proyecto.

Introduction

Environmental Education

The idea of environmental studies begun in 1940s, the teaching of this consists of a mixture of teaching elements of traditional subjects such as geography, history and local studies. The idea of teaching environmental studies became increasingly important which lead to the official terming of Environmental Education in 1960s (Palmer 2002). Since then, a series of congress meetings followed to emphasize and address the issue and importance of integrating it into the education system (Kimaryo 2011).

But why Environmental Education? The UN Millennium Development Goals are highly centered around the health and well being of people, however the basis of improving these situations is by sustaining a healthy environment. Hence, to reach these goals, we must develop a generation of citizens that are environmentally conscious and motivated to manage and sustain environmental resources (Kimaryo 2011). Environmental Education proves to be an effect tool to teach citizens how to conserve and protect the environment by cultivating knowledge, skills, values and positive attitudes towards the environment (Kimaryo, 2011). In addition to that, Environmental Education should be a process where citizen learn their relationship between the environment, their culture with the biophysical world. It should also encourage curiosity, foster awareness in citizens and lead to an expression of positive actions towards their surroundings (UNESCO-UNEP 1992).

In 1987, UNESCO-UNEP suggested that:

“ Environmental Education should simultaneously attempt to create awareness, transmit information, teach knowledge, develop habits and skills, promote values, provide criteria and standards and present guidelines for problem solving and decision making. It therefore aims at both cognitive and affective behaviour modification. The latter necessitates both classroom

and field activities. This is an action-orientated, project centred and participatory process leading to self-confidence, positive attitudes and personal commitment for environmental protection. Furthermore, the process should be implemented through an interdisciplinary approach.”

Environmental Education in Panamá

Education in general should be uniquely designed to fit the situation and culture of a country. Consequently, each country has its own approach to incorporating Environmental Education. Although some countries such as Hong Kong and United Kingdom understand and view Environmental Education as an important issue, they choose not to make it compulsory in its education system (Palmer 2002). Panamá on the other hand, being the bridge between the Americas, possess richness in biodiversity and identifies the importance of conserving its natural beauties. This identification led them to the introduction of Ley 10 de 24 de junio 1992 whereby recognizing that environmental education as a strategy to conserve the environment and development of sustainable natural resources. This law indicated that the State will promote, support and facilitate the integration of environmental education into different subjects. It is essential to take note of this as it was proposed in a Report in Environmental Education by the Scottish Education Department in 1974 that since the environment should be viewed as a whole, it was not desirable nor was it possible for Environmental Education to be taught as a separate subject but to be incorporated into different subjects (Palmer 2002). Additionally, this law has resulted in Panama’s Ministry of Education (MEDUCA) along with other organizations such as UNESCO, Parque Metropolitano Naturale, *etc.* to constantly develop and refine workbooks for Primary Schools to integrate Environmental Education into different subjects. The introduction of Environmental Education at a primary level is important and it was also suggested by UNESCO-UNEP that it is the best time to introduce it into

syllabus because children at Primary level are less trained to compartmentalize learning into subjects. Thus by integrating it into school syllabus at this age, allows children to see the environment from a holistic view as it should be (UNESCO - UNEP 1992).

However, Ley 10 de 24 de junio 1992 did not indicate that the teaching of Environmental Education was compulsory and thus lack of emphasis of Environmental Education teaching in schools lead to some schools to ignore this section. This resulted in the revoking of the previous law and the introduction of Ley 38 de 2 de diciembre 2014 which declared that Environmental Education is now compulsory to be taught in the all schools. The compulsory teaching and learning of Environmental Education in Panamá will leave it with a generation of children that will appreciate the beauty of the environment as a whole and a desire to conserve the environment. Though many growing job sectors are not centred in Biology and Environmental Science, the generation that grows up appreciating the Environment, will make decisions that will incorporate the sustaining of the Environment, no matter in which job sector (eg. Tourism, Mining, Business).

Problem

In the recent years, Parque Municipal Summit have been working on improving Environmental Education through a number of projects such as making information signs, developing interactive activities for visitors and so on. This year, the issue that will be addressed again pertains to Environmental Education, particularly referring to the lack of learning in Parque Municipal Summit.

The issue of lack of learning in Parque Municipal Summit has been weighing on the heart of Sñr. Rafael Gomez. He told us that many times, he has witnessed children having a great time every time they visited Parque Municipal Summit because of the playground and the large opens fields where they could play at. Additionally, the children also seem to enjoy themselves when it came to visiting the animals. But Sñr. Rafael reported how most of them know very little about the animals at Parque Municipal Summit, let alone Panama. For instance, when we were taking an introductory tour around the park, we came across a little boy referring to the jaguars as “leopards”.

Because of the lack of learning at Parque Municipal Summit, the idea of designing an activity book was already planned even before we started our internship. The activity book that we are to design, would consist of activities for children where they could learn actively about plants and animals that are found at Parque Municipal Summit.

Sñr. Rafael’s vision for Parque Municipal Summit is that there should be more educational programs going on at this park, as this is the location where many native plant and animal species are present.

Justification of Problem Part 1: Activity Book

There are different ways in which the environmental education could increase and have increased at Parque Municipal Summit. First, there should be more information about the animals and plants accessible on the site. Although there are some laminated information sheets that mention the name of species and about a sentence of information on the species, it is not present for all species. For example, there is a pineapple plant right at the entrance of the park, but I never saw it until a volunteer pointed it out because nothing is there to identify it. Also, there is a small indoor museum for people to learn more about the harpy eagle, the national bird of Panama. This is a great initiative, but visitors should also have the opportunity to learn about the other animals and plants in the park.

Another good way of widening the learning opportunities would be to have a bank of activities on-site for kids who come to the park. As mentioned above, this is the way that we chose to increase learning at Parque Municipal Summit. These activities will be designed especially for students who are visiting Parque Municipal Summit on a school trip, so that the park could eventually become a more popular destination for teachers to bring their students. If Parque Municipal Summit could provide educational activities related to the park, it would be a good way for the park to get more involved in the educational system. From our knowledge, Parque Municipal Summit is an integral part of a private Panamanian school's curriculum. Indeed, at Colegio Brader, fourth grade students go at Summit every year for the environmental part of their science class. The relationship that Colegio Brader has with Parque Summit is something that could be replicated more in Panamanian public schools, and that would allow students to take a break from the classroom.

Part 2: Testing of Activities ('Learn through Play' vs. Traditional in-class learning)

As mentioned earlier, environmental education recently became obligatory. It is a great opportunity for teachers to explore different teaching and learning methods such as hands on activities. For example, when you want children to understand a chemical reaction works. Teachers could show a reaction where the product is usually a gas so that the class can clearly see the result of mixing two different substances. It is a great way of having the students' attention and to engage them in the process of the teaching. We therefore think the same teaching and learning method could be applied when it comes to learning about environment and conservation. However, in our activity we are mindful to not use the term 'hands on learning' as we believe that 'hands on learning' is a method of learning that allows children to solve problems directly through real life situations. Our activities on the other hand do not only require direct problem solving but also other skills such as creativity. Essentially these activities are designed for students to have fun while learning. Consequently, the term and method that we found appropriate to use for our activity is 'learn though play' method. Moreover, it is inevitable that by visiting Parque Municipal Summit, is a great way to teach the children the biodiversity of Panama and a great way for them to learn about the environment. Consequently, it could spark discussions in groups regarding the different issues pertaining to the environment such as reasons behind the decrease in certain species population and the purpose of conservation, etc.

'Learn Through Play' Method

Kahn and Wright (2013) describes 'Learn through play' as a method of learning where children are left to explore and make sense of their environment through play. It helps with the development of different skill sets such as cognitive, social, emotional, confidence and so on.

The instinct to play is natural character of humans, we have now push past the limits of children's ability by confining them into a classroom environment (Gray 2013). The abnormal confinement of children into room under supervision of an adult, forces the children to sit, listen, read and answer questions that are not necessarily of interest to them has defied their natural drive to play, which plays a huge part of children's natural means of learning (Gray 2013). In addition to that, the promotion of playfulness has proven to increase learning, problem solving and creativity (Gray 2013). Researchers have identified play into the following categories (Gray 2013):

- 1) Play is self chosen and self directed
- 2) Play is an activity in which means are more valued than ends
- 3) Play has structure of rules that are not dictated by physical necessity but emanate from the minds of the players
- 4) Play is imaginative, nonliteral, mentally removed in some way from "real" or "serious" life
- 5) Play involves an active, alert but non stressed frame of mind.

Traditional In-class learning

Traditional in-class learning refers to the classic way in which most learning take place. In our understanding and definition, it refers to the type of learning where teachers lectures students in a classroom setting. It is recorded that the origin of classroom started due to religious purposes, the reason was to get children to learn about the Bible, where students were taught by repetition and memorization. However, today in-class learning does not have to be constrained into strict lectures, it could also consist of discussion between students and teachers.

After identifying that “Learn through Play” could be a non-stressful and effective way for children to learn about the environment, rather than confining students in a classroom, where they might attribute the learning for a ‘goal’ (for example test, quiz). We hypothesize that ‘learn through play’ is a more effective way for student engagement and learning.

Part 3 Testing of Activities (Private School vs. Public School)

In addition to testing whether there is a difference between learning methods, we also wanted to test whether there would be a difference in learning between private and public school. As it was identified in Seoane, Maura and Mercedes (2011) that due to the distortion in income between different household, there is a discrepancy in the quality of education each household receives. The two schools that were chosen for activities to be done at are Colegio Brader a Private School and Escuela Omar Torrijos Herrera. The details of the two school will be further explained in the following sections:

Colegio Brader

Colegio Brader is a prestigious private school located in the neighbourhood of Casa Blanca. Although located right outside San Miguelito, it is evident that there is a big difference between social classes between the two areas. Education levels in Colegio Brader ranges from Kindergarten to High School. Colegio Brader is a bilingual school and has a strict curriculum that encourages students to learn and speak English. In addition to that, the teachers are highly qualified and are required to go through interview process before being appointed by the school.

Escuela Omar Torrijos Herrera

Escuela Omar Torrijos Herrera is seen as a model public school of Panama, its name originated from General Omar Torrijos Herrera who fought to bring back the canal zone to Panama. It is located in the neighbourhood of Paraiso, a town located along the Canal Zone. It is the first Public School that became a bilingual school. Today the school consist of 624 students ranging from Prekindergarten to Grade 6, and 42 teachers. The school is well facilitated with language labs, science labs, information technology labs, swimming pool, dental clinic and so on. Students above Grade 3 have to go through an entrance exam before being accepted into the school.

	Colegio Brader	Escuela Omar Torrijos Herrera
Fees	\$5,250	Free
Appointing Staff	Through interview process	Sent by MEDUCA
Syllabus	Teachers plan their own lesson using different sources	Syllabus provided by MEDUCA
Languages	Bilingual (English and Spanish)	Bilingual (English and Spanish)
Teachers	One teacher for each subject starting from Grade 3	One teacher per class

Table 1: Difference between private (Colegio Brader) and public school (Escuela Omar Torrijos Herrera)

Methodology and Limitation

Code of Ethics

When we met with the teachers of each school, we stated our intentions of conducting these activities. We made sure to respect the guidelines of ethical conduct. In addition to that, we have both completed and received our Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans Course on Research Ethics (TCPS 2:CORES) (refer to page 45).

Part 1: Designing the activities

To ensure a wide variety of topics related to Parque Municipal Summit and environment are covered, we came up with many different themes and a sketch of activity for each of them. Even though Sñr. Rafael guided us throughout the process and gave us necessary help along the way, we were also given a lot of liberty to choose both the topics of the activities and the activity that would go with it. The themes could be as vague as taxonomy or as precise as the endangered animal species at the park. After coming up with the themes of the activities, Sñr. Rafael helped with the assignment of age group for each activity due to our lack of experience with Panamanian education level. After determining the themes and age group for the activities, we designed the activities with the certain age group in mind. During the process of designing the activity, we would have a number of feedback sessions with Sñr. Rafael so that we make any crucial changes for the activities.

All our activities comprise a reading section for the teachers and a worksheet for the students. The teachers' readings are divided in two sections. The first section is called "Objective" and is a general description of what the students are supposed to learn from the activity. The next section is the "background information", which is usually the longest one because it provides information on the topic of the activity to the teachers. The section called "worksheet activity" is a detailed explanation of the game the students will do to consolidate

their learning and the worksheet activity that is associated with it. For example, in the case of the bamboo activity, the game is to draw what can be made out of bamboo and the worksheet consist of four empty boxes for children to draw in. The next section, "vocabulary" defines the meaning of words that are important to the understanding of the subject. The "material" section states what is needed for the children to do the game. Finally, the "references" section includes all the sources used to provide information on the topic of the activity. After the teachers have read the activity and taught the material to the students, there is a game, which is the enjoyable part of the activity and which purpose is to get the students more engaged in the activity and to develop their creative and/or memory skills.

Part 2: Testing the bamboo activity

To have an idea of how our activities (which have a "learn through play" approach) would impact the students learning, we decided to test one of them on different groups of children. We chose the activity on bamboo due to the fact that this activity has gone through several refinements. Since we wanted to examine if there was any difference between traditional in-class learning methods and "learn through play" methods, we decided to have a group of children learn the information in Parque Municipal Summit and then do the game, while the other group would learn the information in class without the game.

We were also very interested in finding out if the students' reaction to this activity would differ according to the school they come from. So, we decided to test the activity on students from two different schools and, therefore, with two different educational background. The first school, Colegio Brader, a private school, was selected because of its close relationship with Parque Municipal Summit. The second school, Escuela Omar Torrijos Herrera, a public school, was selected because of its proximity to Summit. All the students that did the activity were in fourth grade and they were all provided with the same summary 'test' at the end of the

activity to ensure standardization. Both schools had 3 groups of fourth graders, making it hard to separate the students in two equal groups. Hence, we decided that two groups from each school would be tested after the outdoor learning session and the game while only one group from each school would be tested after the traditional in-class learning session.

Part 3: Assessing the children's learning

We did not want the students to feel like they were "tested" because the whole purpose of this exercise was for them to 'learn through play' and we felt that a conventional test where they had to answer questions about the material did not fit with the concept of a fun activity. But at the same time, we wanted to see at which extent the students felt engaged while doing the activity and how it stimulated their creativity. Since engagement and creativity are vague notions, we decided to assess the children's learning qualitatively based on two different tools. The first is our personal observations of the students' body language and behavior throughout the activity and the second is a note sheet where we asked the students to write what that had learned from the bamboo activity. We observed the students' faces when they were learning to see if they were looking at the person teaching the material and if their expression changed when we told them something they didn't know. In addition, we recorded which group asked most questions about bamboo. We also gave the children a blank sheet with a statement telling them to write a summary what they had learn with this activity. By giving them a paper, it would give them the freedom to write down the amount of words of their choice. From this we could then differentiate between the students who were really engaged in the activity and the ones who were less engaged.

We did the activity at Collegio Brader during the science class, which is always given in English, therefore the children received the information in English and wrote what they had

learn in English. In the case of Escuela Omar Torrijos Herrera, we did our activity during the English class, but because the students' level of English was poor, the activity ended up being bilingual. The students from the public school wrote what they had learned in Spanish.

Limitation

Part 1: Activity Book

The large number of activities our supervisor asked us to create was a limitation. This restricted us as we could not spend as much time editing, refining and translating each activity individually because of the excessive amount of time it would have taken us. At the end, we decided to give our organisation a final product that we know could still be improved hopefully by future students.

Part 2: Testing Bamboo Activity

The part of our project where we encountered the most limitation was when we had to test one of our activities with students. We originally wanted to make the children do the activity in the park during the week of March 9 to March 13. But, the fact that our supervisor, on who we relied to contact the schools, was no longer able to work with us made it difficult for us to get in contact with the schools. It was not a problem for Colegio Brader, who had a close relationship with Parque Municipal Summit, but we did not have a phone number or email address to communicate with employees from any public school. So, we tried to move the activity testing to the first week of April, but, unfortunately, the students were on their Easter break. Finally, we were able to do the activity in both schools during the week of April 13. However, since we contacted the school later than expected, it would have been difficult for the teachers to have the approval of the school and the parents in time to bring the students to the park. So we decided that, even if our activity on bamboo was meant to be done at Parque

Municipal Summit because of the presence of a small bamboo forest, we would have the students do the activity at their school, but outside instead of inside the classroom.

Another limitation was the design of the tests that assess the children's learning after the activity. Because we planned to do the activity sooner with the children, we originally wanted to see how much the students learned right after the activity, but also, how well they would have remembered it one or two weeks after the activity. We wanted to do it like this to see which learning method (learn through play or traditional in-class learning) had a stronger long-term impact on the students. But, because the activity testing was done later, we did not have enough time to do a second test later. In addition, it would not have been fair to the group who were learning inside to have to wait one week to do the activity. The groups learning inside still did the drawing and dancing activities, but after being tested.

Our choice of private and public schools was at first a little different than the ones we finally chose at the end. In fact, our former supervisor had initially chosen Colegio Brader and Escuela Fe y Alegria as the two schools who would test our activity. Colegio Brader remained, but our new supervisor recommended us to choose the public school located in Paraiso because it was closer to the park so the transport would be easier for the school. However, our first supervisor had chosen Escuela Fe y Alegria because it was a public school with children from low-income neighborhoods and he wanted us to witness the disparity between the public and private system. While parents pay a fortune for their kids to go to Colegio Brader, it is the opposite for students and teachers of Escuela Fe y Alegria as some of them recently suffered from skin infections due to the school's insalubrity ("Meduca Suspende Clases En Escuela Fe Y Alegría." 2014). In contrast, the Paraiso public primary school, although located in a poor neighborhood, is actually a very good public school.

Results

We collected the sheets of paper where the students were asked to write what they had learned during the bamboo activity. The answers varied a lot because we did not give the students any guidelines other than to try to remember and write what they had learned.

We identified the copies of summary as 'incomplete text' by judging which student had put less effort and did not seem interested or able to write what they had learned. This was done by observing summary text that mentioned only one information or less about bamboo. Additionally, we also identified the copy of students who showed their engagement in the activity by writing a high amount of information. These summary text was then classified into the 'informative text' category. For the public school, we identified the copies where there was at least six bits of information on Bamboo and for the private school, we identified the copies where there was at least four. Students from the private school did not write as much as their counterparts because they were writing in English while the students from the public school were writing in Spanish.

As the graphs clearly show (refer to graphs on page 42 and 43), the group who learned the theory about bamboo in their class was the group where there was the lowest percentage of children who were not engaged, and this is true for both schools. In the case of Colegio Brader, the group that had the highest percentage of 'informative text' was also the group who stayed inside and did not do the activities. It is important to note that during the traditional in-class lectures, we gave students the freedom to take notes but we did not provide them with any kind of visual aid.

Discussion and observations

Differences between the two schools

The most noticeable difference between the two schools was the English level of the fourth graders. While most of the students from Colegio Brader were fluent in English, the students from Omar Torrijos Herrera were not able to understand most of what we were saying. The concerning part is that both schools are officially bilingual. There is certainly a huge gap between students from private and public schools when it comes to English as a second language. This results in unequal learning opportunities between young adults from different educational background. Indeed, according to an employee of the Panamanian Ministry of Education (MEDUCA), students who want to do their undergraduate studies at a public Panamanian university need to pass an international English exam, which usually requires a sufficient amount of understanding of English. Students coming from private school are therefore more privileged and are one step ahead students coming from public schools.

We noticed a difference in the students' participation between the two institutions while we were doing the activity with the children. The students from the private school interacted a lot with their teacher and us. It was striking especially in the group who learned the material in the classroom. Since this group was more focused than the outdoor groups, the children asked a lot more questions and came up with a lot of ideas on how bamboo could be used. For example, some of them were proposing to use it to build golf sticks or jewelry. The students at Escuela Omar Torrijos Herrera, on the other hand, were less inclined to express themselves. Unlike the private school students, they were allowed to speak in Spanish, but still chose not to share their thoughts with us or their teacher. At Colegio Brader, it seemed like the children were encouraged to question and comment on what they were learning

whereas, at Escuela Omar Torrijos Herrera, discipline and courtesy seem to play a big role in the education of the children. This was reflected in the copies of the students. The children from the private school had a lot more creative answers (creative answers refer to drawings and description of what they have learnt rather than point form answers), probably due to the fact that they asked us a lot of questions. Also, although we did not mention anything about drawing, some students from Colegio Brader drew on their copy.

Differences between ‘Learn through Play’ and Traditional in class learning

From the graphs in the result section, it is suggested that the children in Colegio Brader that did the Traditional in-class learning method had more informative text and had significantly less incomplete text compared to the groups that were doing the ‘Learn through Play’ method outdoor. In the Escuela Omar Torrijos, the groups that did ‘Learn through Play’ method outdoor also showed that there were more children that had incomplete text as compared to Traditional in-class learning. Nonetheless, there was one ‘Learn through Play’ group in particular that has more informative text than the other two groups (one ‘Learn through Play’ group and one Traditional in-class group). Overall, from our observation, it seems to be that there were more children that were engaged rather than distracted. Nevertheless, it cannot be concluded that some children were more engaged than others, because the engagement of students cannot be based solely on our observation and our method of evaluating. The reason for this being that there are always uncertainties in trying to evaluate children’s learning and engagement. It cannot be assumed that children are distracted just because they do not engage in eye-contact.

In the introduction to this problem, it was identified that the act/characteristic of play is a positive nature that would increase student’s learning and engagement. Moreover, we also expected that the activity would allow the children to be more creative in expressing what they

learnt through the short summary that we gave them at the end of the activity. However after going through the worksheets through the process described in the result section we identified that there is a difference between the groups that learnt the materials through 'Learn through Play' and Traditional in-class setting. It is important to note that the way that activities were carried out were different in both private and public school.

For the 'Learn through Play' method of learning in Colegio Brader, we had the students sit in a circle outdoors. In the circle, we would pick one student to read a paragraph of the lesson plan that we designed, this will go on until the last paragraph. However, in Escuela Omar Torrijos Herrera, we would read the simplified version of the English text to the children while the teacher took time to translate into Spanish. It was also the same for the Traditional in-class lectures where we would read a simplified version of text and the teachers would translate. However, we encouraged discussions in all groups. We realised that by doing different methods of teaching or explanation of text (between the two schools), it would influenced the way children perceive and learn the information presented to them.

During the 'Learn through play' method in Colegio Brader we found that the students were distracted and they were looking around and not having eye contact with the reader. In contrast, students at Escuela Omar Torrijos were paying close attention to what the teacher was saying. There are a number of factors that could have influenced this. Firstly, the outdoor setting of both schools are different and thus it could be possible that there were more distracting objects around Colegio Brader which is an open space surrounded by trees, and river, rather than Escuela Omar Torrijos where the open space was surrounded by buildings. Secondly, the time of the day could also influence student's attention and thus groups that had activities conducted after a break or lunch may be more active and to some point more distracted.

During the Traditional in-class lectures, the children of both schools seem to be much more attentive than the 'Learn through Play' groups. The children made more eye contact with the reader and/or teacher. The reason for this could be due to the fact that children introduced to classroom setting are conditioned to be in a 'learning attitude' when placed that situation (Gray 2013).

During the 'Learn through Play' method of learning, it was observed that it promoted peer interactions, as the drawings were more similar than to those that were situated in an in-class setting. Although there seem to be less creativity than we assumed, the activity seem to have an influence in enhancing social skills and interaction between student when they were in an outdoor setting and by 'Learn through Play'. On the other hand, the teacher of Colegio Brader observed that days after the activity was carried out, the students still seem to be recalling the 'Tinikling dance' (one of the 'Learn through Play' activity).

Problems with Methodology

The fact that students from the private school wrote in English while the students from public school wrote in Spanish is the main reason behind our difference in methodology when analyzing the students' copies. Indeed, we noticed that the students in Escuela Omar Torrijos Herrera generally wrote longer paragraphs than their counterparts in the private school. This is not a surprise considering the students from Brader learned the material and wrote in their second language, which might not have allowed them to understand or show their understanding as much as the students from the public school. The consequence of this dissimilar methodology is that it would be inaccurate to compare the percentage of complete and incomplete texts from both school, since the answers from the children at Colegio Brader not only depend on how much they learned but also on their level of English.

Also, asking the students to write down what they learned only solicits one type of intelligence, which is the verbal-linguistic type. Our methodology assumed that the students who wrote less were less engaged in the learning process, while it might just have been that they have more difficulty than their classmates when it comes to memorization and writing. The opposite may also be true for children who we assumed wrote down complete texts, they may just be better than average at memorizing and writing. However, it is important to note that the “testing” was only done once right after the activities. If time permitted it would have been interesting to do a follow up “test” to compare results to see the difference between different learning methods. Therefore it is not practical to conclude that ‘learn through play’ is a less effective method of learning than traditional in class learning.

There were a number of problems in methodology referring in particular to the ‘Learn through Play’ method of learning (that was conducted outdoors). Having the children write down a summary of they learnt after the activity was very distracting to the students, as they were already worked up and was hard to them to refocus on writing. The outdoor environment where the children were doing the activity was not the best place for them to be concentrated on learning new material. The heat probably had a lot to do with the students lack of concentration. High heat was shown to have an indirect impact on learners by decreasing their reaction time. (Carol S. Weinstein, "The Physical Environment of School: A Review of the Research," *Review of Educational Research*, vol. 49, no. 4 (Autumn 1979), pp. 577–610.) The groups that were doing the activity outside were also exposed to more noises and a much poorer acoustic than the children who were learning inside the classroom. Indeed, when I was talking about the uses of bamboo to the outdoor students, there was less nodding, eye contact and questions at the end of my short lecture. Thus, the summary of what they learnt cannot be a real reflection of what they have learnt. It would therefore be more ideal if another summary

was to be written maybe a week after the activity to compare the difference in what each group could remember. Also, one thing that could have highly affected our results is that some children that were given the opportunity to read the paragraphs could have written more in their summary thus having an unfair advantage by displaying 'more informative text'.

Implications of our work

For Parque Municipal Summit

By submitting environmental themed activities to Parque Municipal Summit that are aimed at school children, we contribute to the educational resources of the park. The park employees and volunteers could use this set of activities with group of children from various age who come to the park during day camp. The park could even start to organize guided tours of the attractions of Parque Municipal Summit for kids who go there with their parents and have them do one or two activities during the tour.

Since these activities require employees or volunteers to help out, Parque Municipal Summit could increase the amount of employees and volunteers and train them to carry out these activities with the schools. Having this could potentially be an advantage to the job market. In addition, it would also be a huge advantage for the activity book as it would then be in full use.

For future McGill students

The future McGill students doing their internship at Parque Municipal Summit could also benefit from our work. If they are interested in education in Panama and at Parque Municipal Summit, they could build on our work. Since we already designed environmental themed activities, they would have more time to contact schools, organize trips to Parque

Municipal Summit and even develop a better methodology to assess the children's learning, which we did not have time to do.

For the schools

It would be especially interesting for public schools that have less resources and facilities to teach Environmental Education, to consider bringing certain classes to Parque Municipal Summit once a year. It could potentially be a good way for students to learn about the environment outside of the classroom. Parque Municipal Summit is relatively inexpensive as it cost only 1\$ per student.

On a side note, we were informed by the principal and teachers of Escuela Omar Torrijos Herrera that MEDUCA has recently come up with a rule that schools have to get approval from MEDUCA before any field trips can occur, which would then allow them to plan for transportation and such. Although this may seem as a good idea to keep a good record of activities being done in different schools, the approval process may take a while as there are a huge number of schools in the whole Panama. Rather than encouraging field trips, it might discourage schools from wanting to bring students on field trip. Though this may be counterproductive, we suggest that schools should plan ahead of time for any field trips to occur.

For the children

All the activity that we designed for children are meant to be done at Parque Municipal Summit. There are numerous benefits of having regular contact with nature. These include the prevention of illness and the promotion of physical activity. In fact, the simple act of being in a very large park with many attractions encourages visitors to walk a lot. Access to nature is also plays a role in the treatment and prevention of children who are overweight, have

Attention Deficit Hyperactivity Disorder (ADHD), emotional and behavioral difficulties and social communication difficulties ("Health and Wellbeing Benefits of Access to Nature" 2015).

Biophilia is a theory that was first described by the American biologist Edward O. Wilson as "the urge to affiliate with other forms of life" (Kellert & Wilson 1995). This hypothesis has been validated by different studies including one from the University of Essex that showed that being in contact with nature could improve an individual's mood and self-esteem. This was found to be particularly true for people who are inactive, under stress or suffering from a mental illness (Barton & Pretty 2010).

Implications of our results

The results we obtained after testing one of our activities with students: the classroom is a better learning environment for fourth graders compared to outdoor. But, the dance with bamboo sticks had a lot more impact on the students than the information we taught them. So we think that it is still important for the students to have fun activities to not only relieve stress, but also so the children can associate the fun activity with some of the things they learned about bamboo. So, if the children remember the activity for a long period, there is a chance that they will also remember some information about bamboo for a long period. So our recommendation for students of fourth grade would be to make sure that lectures are given in the classroom, because of the distracting aspect of outdoor environments, but to also integrate enjoyable activities in the curriculum related to subjects that students were previously taught.

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Appendices

Images



Image 1 Colegio Brader Students Drawing the uses of Bamboo



Image 2 Colegio Brader Students dancing the Tinikling Dance



Image 3 Escuela Omar Torrijos Herrera Students doing the Tinikling Dance



Image 4 Escuela Omar Torrijos Herrera Students receiving 'Traditional in-class' Lecture



Image 5 Colegio Brader



Image 6 Escuela Omar Torrijos Herrera

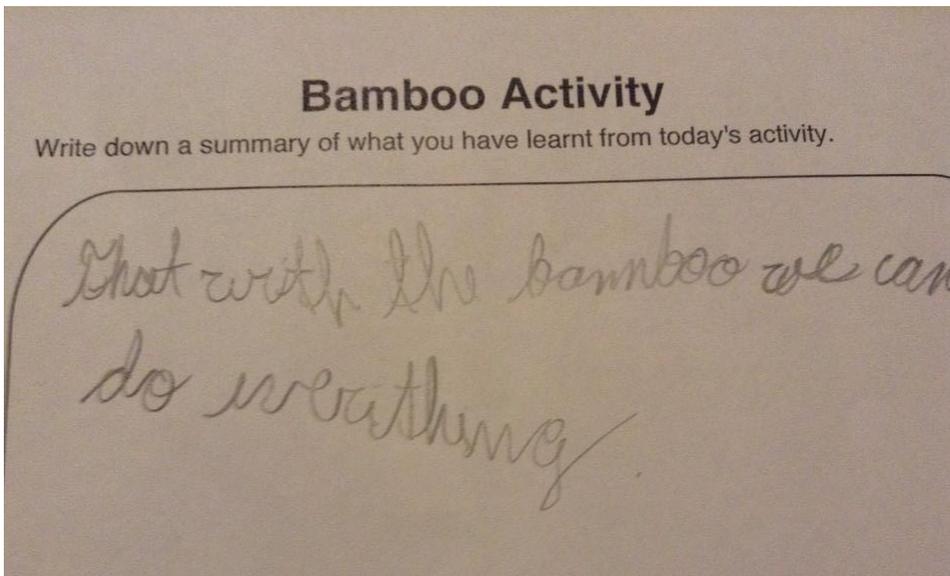


Image 7 Example of 'Incomplete Text' "That with the bamboo we can do everything"

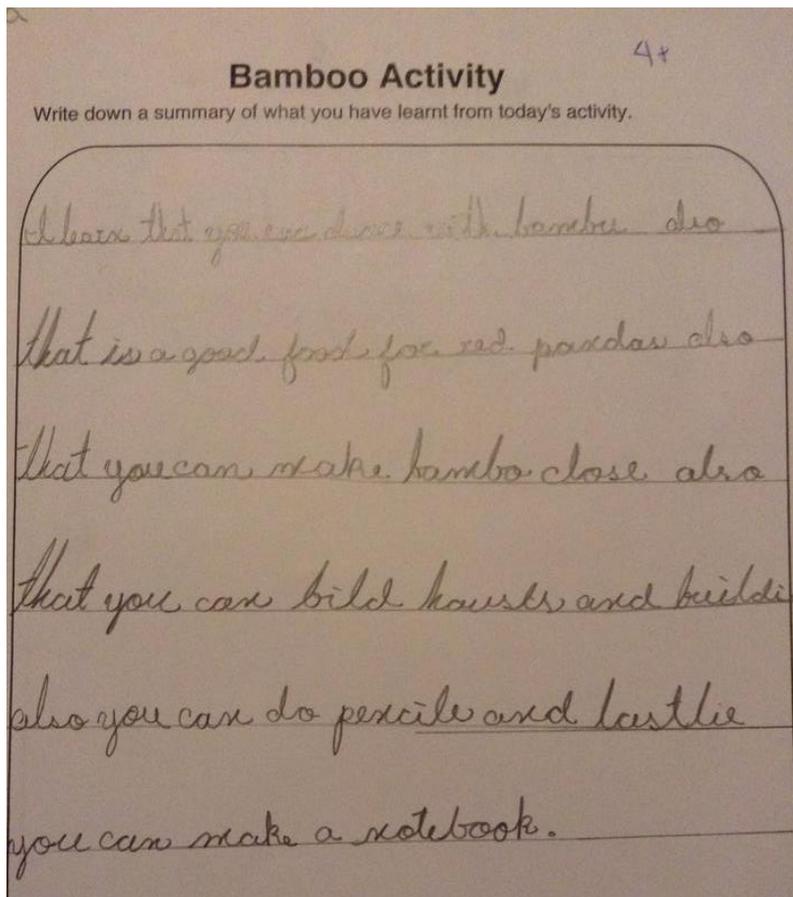


Image 8 Example of 'Informative Text' "I learn that you can dance with bamboo, also that is a good food for red pandas also that you can make bamboo clothes also that you can build houses and buildings also you can do pencil lastly you can make a notebook."

Bamboo Walk Activity Set

Bamboo walk

For this activity, draw the many uses of bamboo in the following boxes.

Bamboo Walk

Objective

To allow students to understand the variety of uses of bamboo

Background information

Have you ever thought that using bamboo could protect the environment?

Bamboo is the fastest growing plant in the world, it can grow 1m only in a day! The bamboo stem reach its full diameter in only 3-4 months. The tree can be harvested for building material in only five years, while other lumber trees take between 20 and 40 years. Bamboo grows much faster than lumber trees because it is a grass, not a tree. Indeed, bamboos do not have a woody stem like trees and shrubs. They also do not possess bark. Bamboo also grows straighter than lumber trees.

Using bamboos as a construction material is a very environmentally-friendly choice because it takes less time to reach maturity and the bamboo plantation can recover faster after each harvest due to the plant's high growth rate.

Bamboos are also very efficient in storing CO₂, which is a major greenhouse gas contributing to climate change. In fact, each hectare of the bamboo forest of Carrasco National Park in Bolivia is estimated to store levels of carbon comparable to much larger tree species.

Bamboos can also help control soil erosion. Soil erosion is defined by the loss of the first layer of soil, which can lead to flooding or desertification. The strong roots of bamboo trees absorb water and hold the soil particle together, therefore preventing erosion.

Bamboo trees have more than 1000 uses. This type of tree is most famous for being the major food source of China's giant panda, an endangered species. But it also provides food for red pandas, lemurs, gorillas and chimps. Since Bamboo is a grass, it makes a good pasture for cows, horses and even gorillas. Bamboo shoots are also a very popular food in many asian cultures.



What can you make out of bamboo?

- Paper industry: Carboard, coffe filters, toilet paper
- Textile industry: Clothing, sheets, towels, mattresses
- Food / beverage industry: Tea, wine, vinegar, beer
- Car industry: Steering wheel, dashboard
- Sports and recreation industry: Bicycle, skateboard, surfboard, snowboard, ski poles, fishing rods, golf tees
- Electronic industry: iphone cases, mouse, keyboards, headphones, laptops

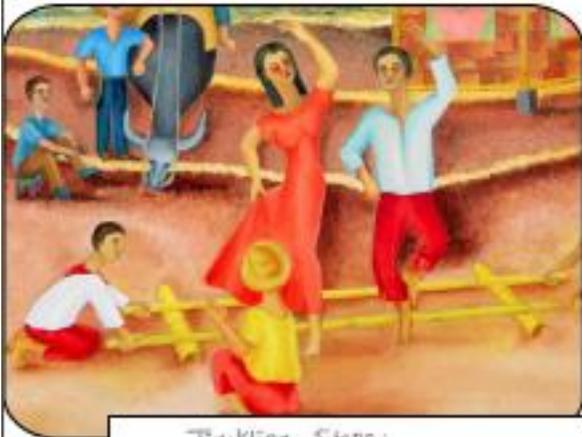


Tinikling Dance

Tinikling dance originated from the Visayan Islands of the Philippines. It is now, the most popular traditional filipino dances. There are many theories that have been passed down regarding the origin of this dance.

One theory says that dancers imitate the graceful and speedy movement of the tinikling bird. As the birds are eescaping and dodging the traps of rice farmers.

While another theory says that the dance was started by rice farmers of the Philippines. When the Spaniards arrived, the workers had to work extra hard to please them. But when they did not work well, the spaniards would punish them by clamping their feet. This dance portrays the way they try to escape from the clamping.



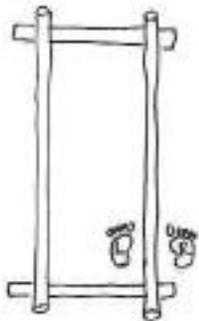
Teachers lesson plan copy

Tinkling Steps:

Single

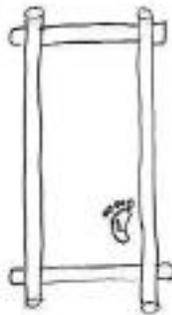
☺ - left foot
☹ - right foot

①



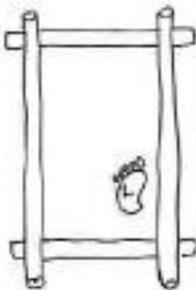
Start by placing both feet on the ground.
Left foot in between the bamboo poles while right foot outside the poles

②



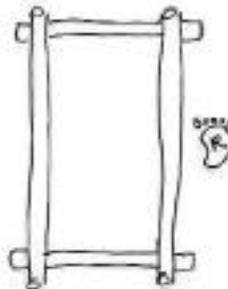
Hop on your left foot lifting up your right foot.

③



Repeat the same step

④



Hop on your right foot lifting up your left foot.

⑤ You have completed the basic step of the tinkling dance, you can repeat from step ② to step ④ to continue dancing the basic dance steps.

Worksheet activity:

- 1) The purpose of this bamboo walk activity is to teach students the variety of uses for bamboo.
- 2) To start the activity, get students to go on the bamboo walk (30 mins) with worksheets. Ask them to come back and ask them different uses of bamboos. For example:
 - (a) for eating - animals, humans (commercial purposes)
 - (b) making musical instruments
 - (c) house construction
 - (d) traditional uses
- 3) Discuss the different uses of bamboo with the student.
- 4) Proceed with the re-enforcement activities (look at the next bubble).

Re-enforcement activity:

- 1) Do the Tinikling dance. (Instructions and basic steps are illustrated in the previous page)
- 2) Have the students sit in a circle. Ask them to tell a story, with each student mentioning one usage of bamboo. The first student that starts, will begin the story and will mention one usage of bamboo, after that the student will sit down. The second student on the left will stand up and continue the story mentioning another usage of bamboo. Continue until the circle is finish and every student had the

Vocabulary

Sustainable: able to be maintained at a certain rate or level

Material

Bamboo stick for tinikling dance

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Figures

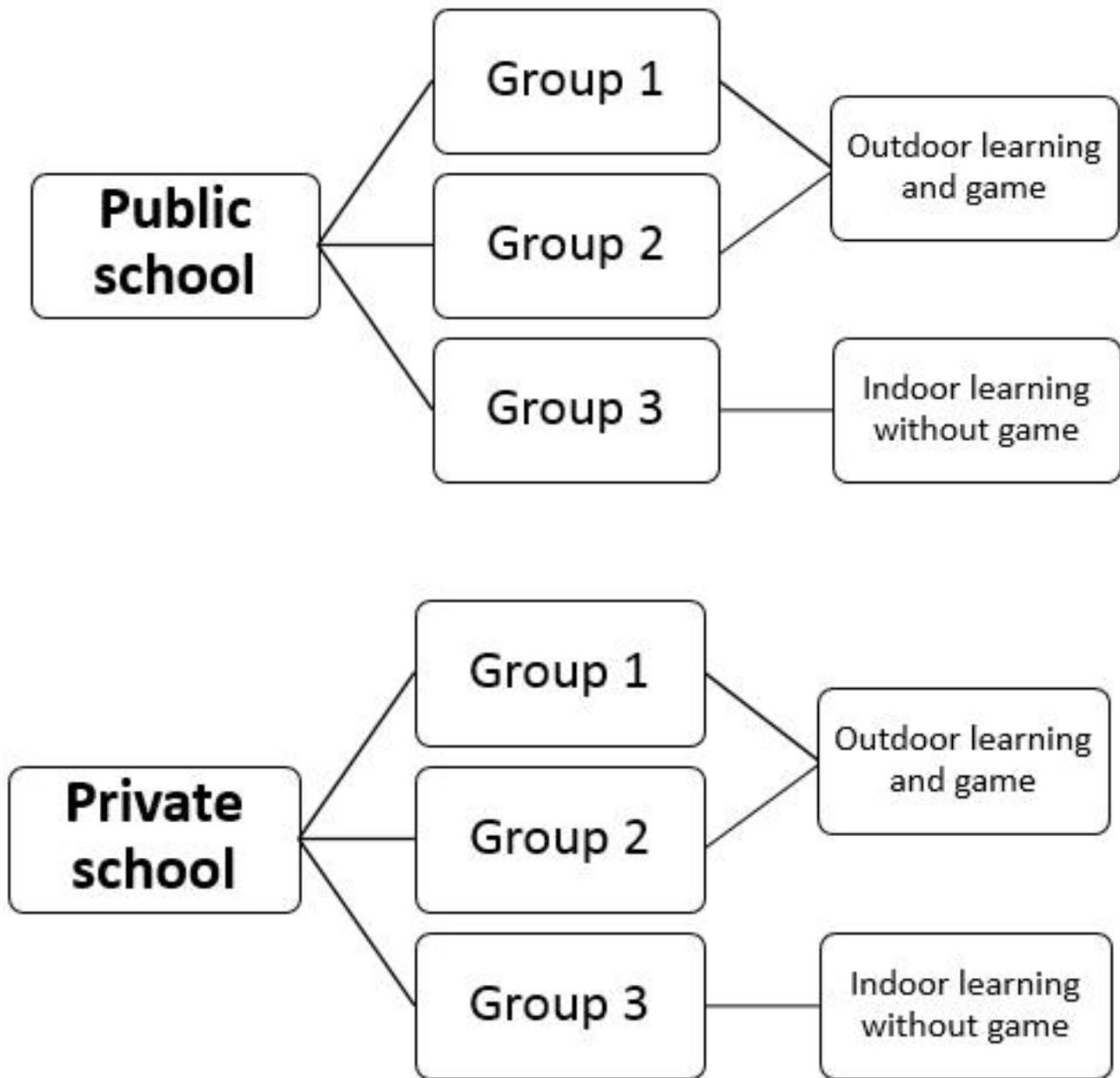
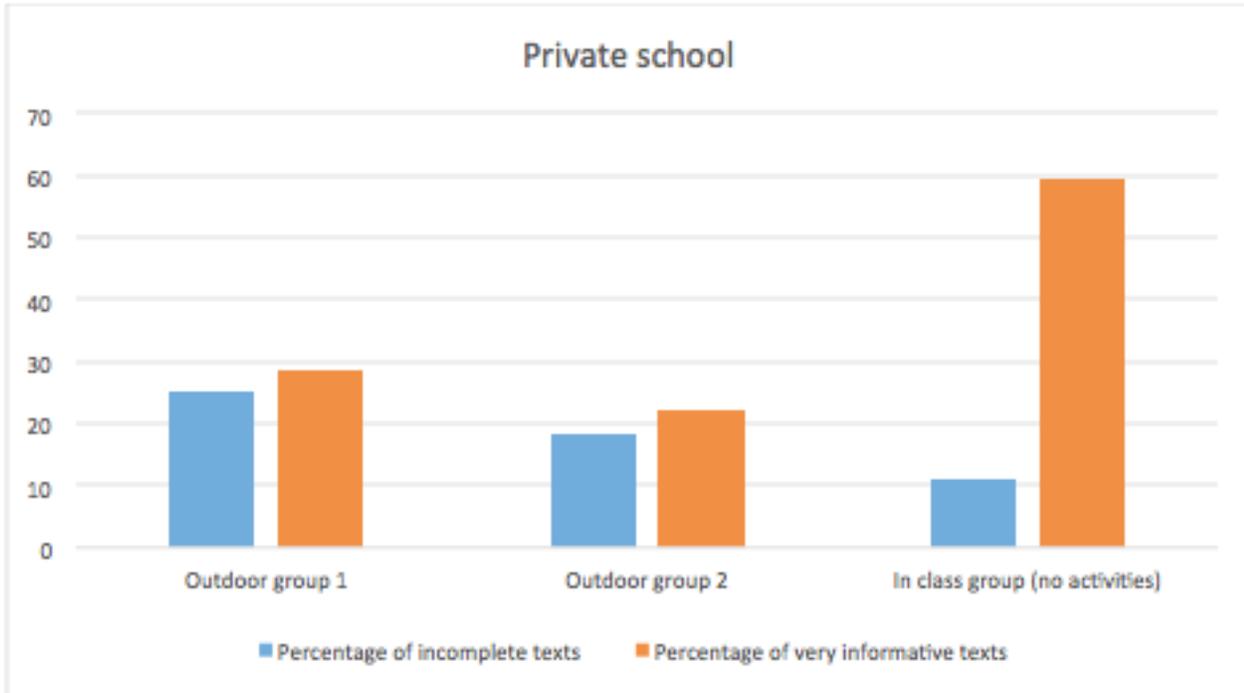
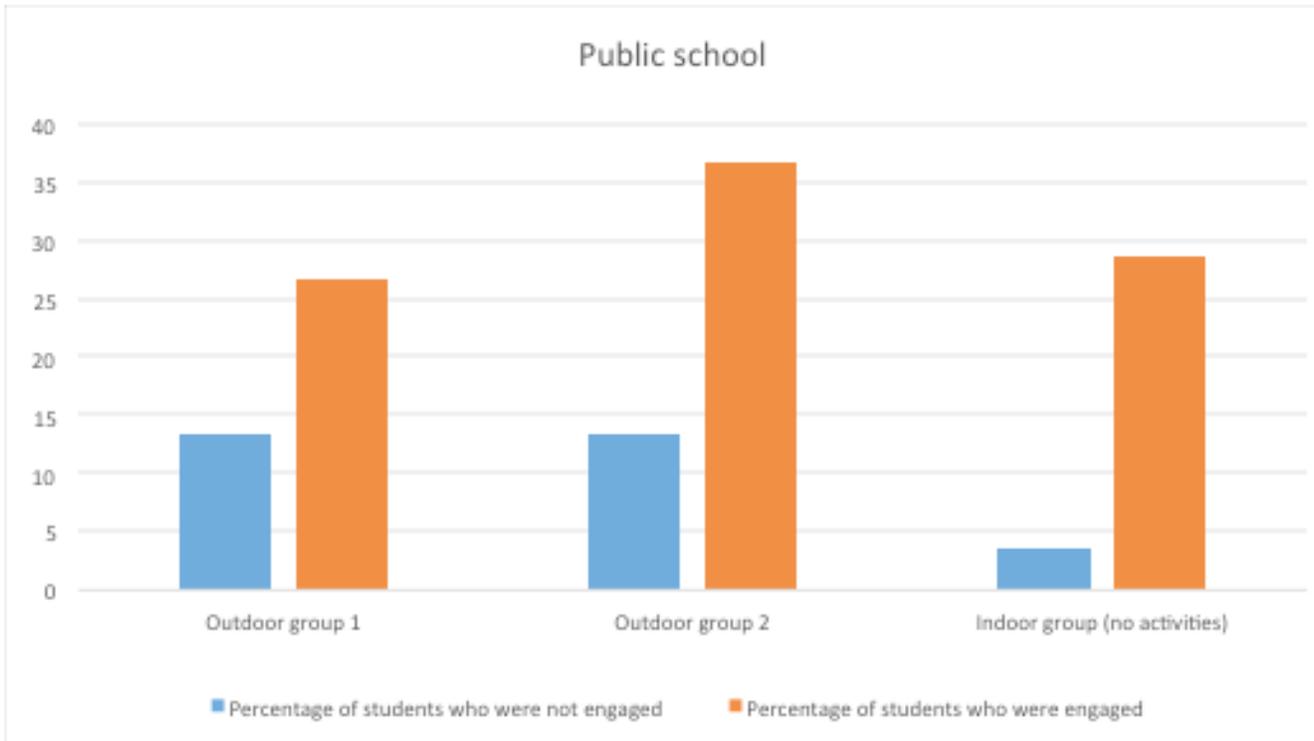


Figure 1 Activity testing diagrams for both private and public schools

Graphs



Graph 1 Percentage of 'incomplete text' and Percentage of 'informative text' for Grade 4 students of Colegio Brader



Graph 2 Percentage of 'incomplete text' and Percentage of 'informative text' for Grade 4 students of Escuela Omar Torrijos Herrera

Certificate of Completion

This document certifies that

Nadia Lee

*has completed the Tri-Council Policy Statement:
Ethical Conduct for Research Involving Humans
Course on Research Ethics (TCPS 2: CORE)*

Date of Issue: **4 January, 2015**

Certificate of Completion

This document certifies that

Véronique Cartier-Archambault

*has completed the Tri-Council Policy Statement:
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Course on Research Ethics (TCPS 2: CORE)*

Date of Issue: **24 December, 2014**

Further work

The first step in the continuation of this project would be to refine the activities and make sure that they are well adapted to the different children's grade. Translating the activities that have not been translated would also be a good idea. Testing activities with other schools than Collegio Brader and Escuela Omar Torrijos Herrera would be relevant. Also, working with other activities than the bamboo walk would be interesting.

Of course, the major change to bring to our methodology would be to test the impact of the activities on the children while they are at Summit, not at their school. In addition to doing the activities with students in a school trip at the park, the future McGill students working with Summit could also do the activities with smaller groups of children coming at the park with their parents. Indeed, there would probably be a difference in the behavior of the children in a large group with their pairs and the children in smaller groups composed of unknown kids.

Finally, a more efficient way of assessing the children's learning could be developed with the help of teachers from different school.