Comparative Analysis of Behavioral Engagement and Transferable Skills in Conventional and Montessori Schools

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Abstract

While existing research reveals that engagement is an important factor contributing to students' success, recent studies offer a limited range of work addressing students' engagement across different types of elementary schools. This study explores and compares levels of behavioral engagement and the development of transferable skills among elementary students attending a public conventional school (PCS), a public Montessori school (PuMS), and a private Montessori school (PrMS). Since research involving Montessori schools reveals positive outcomes for students, the purpose of this work is to determine whether alternative schools, such as Montessori schools, foster students' behavioral engagement more effectively than conventional schools do and whether those alternative schools ultimately provide for a greater development of transferable skills. A total of 63 elementary school children attending three different types of elementary schools (PCS, PuMS, PrMS) participated in the study. Data on students' behavioral engagement were collected at each site through observations and specifically designed assessments. Data on transferable skills were collected at each site through teacher and parents' surveys. The primary analysis of On/Off Task and Non-Academic Engagement assessment as well as the teachers' answers to survey items found a significant difference between students' levels of engagement and transferable skills across these three schools confirming the research inquiry. These findings provide an insight regarding the current status of engagement and development of transferable skills among students attending different types of elementary schools, help us to identify the areas for potential improvement in our educational approaches, and open discussions exploring new methods of teaching which address the fullest potential of children in the 21st century.

Keywords: Behavioral Engagement, Transferable Skills, Alternative Schools, Montessori Schools.

1. Introduction

We know that students' success depends on family socioeconomic status, parents' involvement in children's life, nutritious diet, and school itself. [1] Recent research also reveals that engagement is an important factor which not only contributes to students' academic performance [2] but also influences identity, enhances our acquisition of skills and occupation opportunities as well as shapes our morals and ethics. [3]

However, studies show that 40% of high school students reported they were disengaged from their school.[4] In 2012, the National Center for Education statistics reported that the drop-out rate in the USA for students ages 16 through 24 was seven percent[5] affecting approximately 2.7 million individuals [6]. The student drop-out rate in these statistics is defined as

> the percentage of 16 through 24-year-olds who are not enrolled in school and have not earned a high school credential (either a diploma or an equivalency credential such as a General Educational Development [GED] certificate.[7]

Research reveals that those without high school education are more likely to experience poverty, suffer from bad health, and participate in deviant activities which negatively affect their personal and professional life.[8]

As shown in previous studies, high engagement increases achievement and decreases the potential for quitting school.[9] However, traditional educational settings overemphasize hard work, self-discipline, and respect for authority as essential factors guaranteeing students academic success (high engagement)[10] but overlook research on student engagement revealing that many students do not feel intellectually, socially, or emotionally involved [11].

In light of the latest brain and child development research[12], early education organizations emphasize we implement our curriculum with the age appropriate tasks which address students' individual needs[13] and provide not only formal knowledge but also transferable skills[14]. Flexible curriculums that address students' potential can provide for excellence, lower drop-out rate, as well as successful and purposeful advancement of individuals.[15]

Non-conventional or alternative educational models such as Montessori schools not only provide child-centered and holistic curricula which meet such recommendations[16] but also report positive outcomes for their students[17]. It is then hypothesized that alternative schools, such as Montessori schools, foster students' behavioral engagement more effectively than conventional schools do and ultimately provide for a greater development of transferable skills.

1.1. Engagement – Definitions

In general terms, engagement refers to our interactions with other people (families, teachers or friends) and with materials (reading a book or playing sports).[18] Engagement, in its classical terms, is defined as

> student's psychological investment in and effort directed toward learning, understanding, or mastering the knowledge, skills, or crafts that academic work is intended to promote.[19]

Different theorists investigate different aspects of students' engagement but there is a common agreement that engagement involves cognitive, behavioral, and affective (emotional) engagement[20] and it is a result of numerous complex interactions involving students, families, peers, teachers, and schools [21].

This work focuses on behavioral engagement which refers to students' level of participation in learning tasks and its correlation with positive conduct (academic, social and extracurricular participation) not only inside the classroom but also outside it. [22]

1.2. Alternative Schools: Montessori

Montessori education is embedded in Dr. Maria Montessori's philosophy which approaches education from a holistic perspective and emphasizes children's independent inquiry while opposing strictly following a fixed curriculum. This approach greatly appreciates the stages of child development and offers curriculum which allows students to engage in age adequate learning tasks. [23] In Montessori school, students work in mixed age groups (0-3, 3-6, 6-9, 9-12), use specifically designed materials, and chose freely from the available curriculum including Sensorial Language, Mathematics and Geometry, Geography, Culture/Music/Art, and Practical Life. [24]

1.3. Transferable Skills

We refer to transferable skills when we discuss 21st century skills, executive skills, lifelong learning skills, or job skills.[25] While most of us think of transferable skills in the context of occupation, transferable skills have a broader meaning and refer to the skills which we learn in one situation and transfer to another.[26]

According to the Center on the Developing Child at Harvard University (2011) studies involving brain development and early childhood experiences have been showing a strong relation between early childhood experiences and the development of these transferable skills. The brain's main functions of working memory, mental flexibility, and self-control (aka executive functions) provide for "multitasking, displaying self-control, following multiple step directions even when interrupted, staying focused (…) which are required for daily life and success at work".[27] While children are not born with these skills, they have the greatest potential to develop them at their early stages of development; after birth and especially when they are between 3 and 5 years old.[28] Developing transferable/executive skills can improve children's performance at schools, engage them in more positive behaviors, provide good health, and produce successful work. [29]

2. Methods

2.1. Methods Design

Triangulation research model involved collecting data through observations, specifically designed assessments, and surveys. Observations were conducted at each site in three thirty minute intervals during the first three hours of a school day for five days. During one thirty minute session, observations of different students were reported in five 10 seconds intervals on the On/Off Task form providing 150 observations a day. For the remaining two other thirty minute periods, students were observed for the purpose of collecting qualitative data. Observations took place without manipulating, controlling students' environment, or interacting with them. Indicators of the behavioral engagement included: following teacher's directions, listening to a teacher, participating in discussions, concentration, attendance, participating in extracurricular activities, and task completion. Quantitative data were also collected through the Attendance List, Extracurricular Activities List, and Overall Completion Task. Surveys, which consisted of 15 closed-ended questions, were administered for completion to parents and teachers. They were used to measure the following transferable skills: following multi steps directions, self control, focusing attention, teamwork, problem solving.

2.2.Participants

Three different types of schools (public conventional school (PCS), public Montessori school (PuMS), and private Montessori school (PrMS)) were non-randomly selected among schools in the Combined Statistical Area of 344,440 people. The selection of one public Montessori school and one public conventional school was based on offering elementary programs as well as similar demographic characteristics of students (Table 1). One private Montessori school with high classic Montessori implementation fidelity was selected from private Montessori schools in the area. The school with the high classic Montessori implementation fidelity is the school in which the program is the most similar to the original principles of Montessori philosophy.[30]

Table 1. School sample demographics. [31]

Type of School	Conventional School	Public Montessori School	Private Montessori School
Number of students per classroom	25	28	17
Percent of low income students	46%	42%	None
ISAT score	65%	65%	
Race/Ethnicity	White: 56.6% Black: 27.8% Hispanic: 3.9% Asian: 1.9% Mixed Races: 8.7%	White: 61.4% Black: 24.1% Hispanic: 0.8% Asian: 1.6% Mixed Races: 10.9%	White: 76.5% Black: 0% Hispanic: 11.8% Asian: 11.8% Mixed Races: 0%

3. Results

3.1. Primary Analysis

3.1.1.behavioral engagement: On/Off Task

The analysis of variance (Anova) shows a significant difference in On/Off Task assessment, $F(2,12) = 11.12$, $p=.002$, between the mean number of student's behavioral engagement episodes across these three types of schools. Post-Hoc (Table 2) comparison of differences between 2 categories (PCS and each Montessori school) shows that students at

the PCS, on average, engaged in fewer On Task episodes but greater Off Task episodes when compared to students at two Montessori schools.

Table 2. Anova/Post-Hoc: On/Off Task.

ANOVA: ON TASK

Sample (I)	Sample (J)	Mean Diff. (I-J)	Std. Error	Sig.
1	2	-9.800*	3.460	.037
	3	-16.200*	3.460	.001
2	1	9.800*	3.460	.037
	3	-6.400	3.460	.196
3	1	16.200*	3.460	.001
	2	6.400	3.460	.196

1 (PCS), 2 (PuMS), 3 (PrMS)

ANOVA: OFF TASK

Sample (I)	Sample (J)	Mean Diff. (I-J)	Std. Error	Sig.
1	2	9.800*	3.460	.037
	3	16.200*	3.460	.001
2	1	-9.800*	3.460	.037
	3	6.400	3.460	.196
3	1	-16.200*	3.460	.001
	2	-6.400	3.460	.196

1 (PCS), 2 (PuMS), 3 (PrMS)

3.1.2. behavioral engagement: observations

Observations collected during two thirty minute sessions at each school were later coded for Engagement (student engagement with lesson/class), Disengagement (student disengagement with lesson/class), Non-Academic (student engagement in non-academic environment), Environment (student engagement with learning environment), and Peers (non-academic engagement with peers). Please refer to Table 3 for the codes and the codes' qualifiers.

Table 3. Behavioral engagement coding.

Code	Behavior
Engagement	Listening/following instructions, participating by raising hands/ answering questions/ asking relevant questions/contributing to class discussions, working on assigned problems.
Disengagement	Not listening/not following instructions, leaving work, gazing, yawning, wandering, stretching out, laying down on the floor/ desk, not doing the assigned work.
Non-Academic	Playing with hair/pencils/paperballs/ erasers/backpacks/fuzz, picking nose, rolling pencils, checking skin/clothes/ears, fixing shoes/nails.
Environment	Playing with materials that are already out, sharpening pencils, looking at the carpet with maps, grabbing crayons, playing with number chart, taking pictures, pushing ipad down to the floor.
Peers	Talking, observing others rather than doing school work, making faces, interrupting others, visiting.

The primary analysis of variance (Anova) regarding Engagement ($F(2,12)=1.46$, $p=.271$), Disengagement ($F(2,12)=3.882$, $p=.050$), Peers ($F(2,12)=2.003$, $p=.178$), and Environment ($F(2,12)=1.535$, $p=.255$) reveals no significant difference between the mean of students' episodes across these three types of schools.

The primary analysis of variance (Anova) regarding Non-Academic episodes reveals a significant difference ($F(2,12)=6.34$, $p=.013$) between the mean number of students' episodes of Non-academic engagement across these three types of schools. Post-Hoc (Table 4) comparison of differences between 2 categories (PCS and each Montessori school) shows that students at the PCS, on average, engaged in a greater number of Non-Academic episodes when compared to students at the Montessori Schools.

Table 4. Anova/ Post-Hoc: Non-Academic.

Sample (I)	Sample (J)	Mean Diff. (I-J)	Std. Error	Sig.
1	2	10.000*	3.018	.016
	3	8.400*	3.018	.041
2	1	-10.000*	3.018	.016
	3	-1.600	3.018	.858
3	1	-8.400*	3.018	.041
	2	1.600	3.018	.858

3.1.3.transferable skills: surveys

The analysis of variance (Anova) shows a significant difference, $(F (2,12) = 8.14, p=.001)$, between the mean scores of teachers' answers to survey items across these three types of schools. Post-Hoc comparison of differences between 2 categories (PCS and each Montessori school) reveals that according to the teachers, students at the Montessori schools have developed a greater level of transferable skills when compared to students at the Public Conventional School. Figure 1.
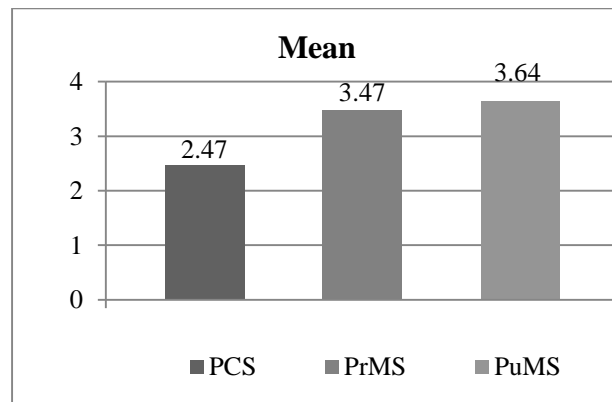

Figure1.Transferable skills based on mean of teachers' survey answers.

The analysis of variance (Anova) finds no significant difference $(F(2,12)= 3.41, p=.042)$ between the mean scores of parents' answers to survey questions across these three types of schools. Therefore, based on parents' answers to survey questions, no differences are found in the level of transferable skills of the children attending these three schools.

1.2. Secondary Analysis

3.2.1.behavioral engagement

While Anova results find significant differences in the On/Off Task assessment and the episodes of the Non-Academic engagement, the results of the qualitative data also show differences in the quality of students' participation, the tools of engagement, and the students' passivity among these three types of elementary schools.

3.2.1.1.participation: intensity and complexity

This study reveals that while students, as a group, in each school participated during class question-answer activities, a greater proportion of students at the Public Montessori and Private Montessori School raised hands to answer the questions when compared to the proportion of students who raised their hands at the Public Conventional School. One

potential explanation of such state might be different types of teacher - student relationships existing in these three classrooms. Research reveals that positive, close, and supportive teacher-student relationships provide for students' trust and greater engagement in learning[32]. Also, in order to engage, students need autonomy, competence, and relevance which are better met by the child-centered environment.[33] Therefore, students at these both Montessori schools might have exhibited a greater level of engagement in terms of its intensity because these schools have created more positive teacher – student relationships and as child centered environments they might meet the child's needs more effectively.

In terms of complexity, when answering the questions, students at the Public Montessori and Private Montessori School were noted not only to speak in complete sentences but they also answered, in general, with confidence. On the contrary, students at the Public Conventional School provided mostly one word answers. Also, when answering the questions, they spoke very quietly. It is clear that these differences in responses will depend, to some degree, on the type of questions asked and the frequency of these questions being asked. Specifically, closed-ended questions such as "What day will it be tomorrow?"or "Do we have houses in our community?" do not really create an opportunity for students to provide longer answers. On the other hand, open-ended questions such as "What is wrong with this sentence?" or "Why are we using bookmarks?" not only allowed for full/complete answers but also allowed them to "draw from their (students) prior knowledge rather than accepting "yes or no" responses[34]. In this study, qualitative data show that a proportionally greater number of students at the Public Montessori School than at the Public Conventional School raised hands when asked open-ended questions and spoke in complete sentences. The time devoted to the teacher asking questions and students providing answers (question-answer time), in the Private Montessori School, was shorter when compared to the question-answer time in the Public Montessori School and Public Conventional School, and therefore the data on the quality of the question-answer time in the Private Montessori School are limited. Even though question-answer time was limited during observations at the Private Montessori School, this study reveals that students at that particular school used more advanced words such "organic", "natural", or "proteins" when providing answers to a question regarding staying healthy during the fall season. However, as indicated in the previous research, we know that the scope of one's vocabulary is highly related to one's socioeconomic background[35] therefore this will not be discussed here any further.

3.2.1.2.tools of engagement: learning environment, adults, and technology

During observation, it was noted that students in each school exhibited a greater level of engagement in terms of duration and intensity when working, without adults' direct supervision, in the specific physical spaces provided within the classroom parameters. Specifically, students at the Public Conventional School exhibited a greater level of engagement when working in the space referred to as "the library". Students at the Public Montessori School and the Private Montessori School exhibited greater level of engagement when working on individual mats, also referred to as rugs.

Analysis of "the library" and the mat in the context of what they symbolize in our society provides a framework for a potential explanation why these two particular learning environments foster engagement. A library, for most of us, is a familiar public space we visit or hear about sometimes before we even reach school age. As young children, we experience libraries usually with the assistance of adults who introduce us to the norms and rules guiding behavior in the library. By the time we start attending school, we are already accustomed to these rules and norms. These norms and rules include speaking quietly and only if necessary, not interrupting others, reading books, etc. As this study shows, when we bring familiar outside spaces, such as the library, into our traditional school spaces, we might expect that they will create classroom environments that are guided by the same norms and rules as observed at the traditional settings of those outside spaces.

Using mats in Montessori classroom is associated with a particular ritual.[36] Unrolling a mat initiates work, rolling it back in a specific manner and putting it back in a basket completes the work. Furthermore, since mats represent work, students are expected to respect them by not walking on them or overlapping them.[37] As observed in this study, students at both Montessori Schools showed a greater level of engagement when working on mats. Understanding the significance of work and participating in setting up one's own working space organizes the day and creates a respect for others who participate in the same ritual.

This study also reveals that students at all three schools exhibited a greater level of engagement when they were working under the direct supervision of adults or when they were redirected by adults. In our society, we respect authority and those who are considered to have power. We associate authority and power with adults. Children at a young age are to respect adults because, at the very basic level, adults provide children fundamental human needs that include food, shelter, and clothing. By the time children enter school, some of them are well accustomed to our

normative expectation of younger people respecting authority that usually is carried out by the elderly. Students who follow and listen to teachers' directions not only appear to be engaged but also show respect for their teachers. In this context, this study shows that students at all three schools have exhibited a great understanding of societal norms involving respect for authority.

The findings of the qualitative data also reveal that students at the Public Conventional School and the Public Montessori School were using computer technology such as tablets (iPads at PuMS) or laptops (Chrome Books at PCS) when completing particular school work. It was observed that students at these two schools exhibited a greater level of engagement during the time they used this technology. It has to be noted, however, that students at the Private Montessori School didn't use any computer technology for their school work. There is considerable research exploring the importance of technology in our classrooms, meeting the needs of the fast growing digital generation of students, and increasing level of students' engagement.[38] This study confirms prior research findings revealing that the students who used technology when working on school work exhibited a higher level of behavioral engagement when compared to times they didn't use it or were engaged in other activities. However, using technology didn't make any significant difference in students' overall behavioral engagement when compared to students at the Private Montessori School who didn't use technology at all.

3.2.1.3.passivity: classroom structure and peers

During this study while students at all three schools used restrooms during work times, particular students at the Public Conventional School were observed to use it more often and for longer periods of time than particular students used it in other schools. On some occasions some students could have had true physiological needs to use the restroom (especially if they have just finished eating and/or drinking), and one student in Public Conventional School was known to use the restroom more frequently and for longer periods of time because of some medical condition. On other occasions, it was clear that particular students used the restroom to avoid class work. While there are many reasons why some students become passive, research provides that students become disengaged faster if they do not connect with the curriculum content and if they are distracted by outside factors. [39] The restroom, which is an indispensable part of the contemporary school/classroom design, provides students with a great hiding area in which they are left alone and not being criticized for not doing school work.

This study also shows that young children as much as adults have a need or a desire to interact with those of similar ages. Specifically, students at all three schools appeared to be engaging at various points of the day and at different lengths of time with peers in what appeared to be a non-academic activity (visiting/chatting with other students during school work and when students are not instructed by the teacher to engage in conversation with peers). While it is possible that some students engaging with their peers during those non-academic interactions could potentially discuss issues related to school work, during this study, in general, it was undetermined which conversations among peers were related to school work. Only on one occasion, at the Public Conventional School, students were actually instructed by the teacher to turn towards their peers and discuss the school work. All other times, as addressed in this section, students decided on their own to visit and/or chat with their peers. Research reveals that students' interactions with peers impact engagement. [40]

3.2.1.4.transferable skills

While not intended, during the process of coding observations, additional qualitative data were identified on self control, team work, and problem solving.

Self-control. Students at all three schools resisted the urge to answer the questions quite well unless permitted by a teacher. They all also were engaged in class tasks when working at specific learning environments (on mats or "the library"). However, students at the PuMS and PrMS were also noted to use methods such as a "freeze game" to reduce/eliminate distraction factor (disturbing/interrupting student) and possibly to control themselves. These observations confirm findings associated with the teachers' answers to surveys revealing that students at both Montessori schools exhibited more advanced self control skills when compared to students at the PCS.

Teamwork. Students at all three schools exhibited team work skills when helping and sharing with others. However, students at different schools, in this study, were observed to exhibit a different intensity of these skills. Specifically, students at the PuMS, by using phrases such as "We can do it" or " We don't give up in this classroom", and by looking for other students' confirmation after they corrected a challenging sentence have exhibited a great sense of group belonging which ultimately fosters greater level of teamwork. Students at the PrMS were not only observed helping other students/adults when asked for help but also offer help before being asked. For instance, when a student

or a teacher dropped something by accident, students who were in close proximity, almost instantly started helping to clean up. When a student at the PrMS expressed he needed an eraser, two students offered that he could borrow their erasers. On the contrary, when a similar situation was observed in the PCS, a student who was asked for an eraser initially ignored the request and after some time of hesitation shared his eraser with the other student who needed it. These observations confirm the teachers' answers to survey reflecting that students at PCS demonstrated capabilities/desires to meet groups' goals at a lesser level than students did it at the two Montessori Schools. As prior research reveals, students at Montessori schools have access to limited sets of learning materials[41] which might signify the importance of sharing and collaboration with other students. This could be discussed further in terms of Montessori philosophy emphasizing community rather individual's success.

   Problem solving. Students at all three schools, when faced with general problems such as not knowing where to find particular items or how to spell words tried to solve these problems by asking their peers for help. When a problem involved accidental breakage or spillage of learning materials, students at the Public Montessori School fixed them by themselves and were more interested in the item itself and how it could be fixed than watching for the teacher's reaction. On the contrary, in a similar situation, students at the Public Conventional School reported the damaged item to the teacher within a shorter period of time. Also, when a teacher asked a student at the Private Montessori School to tie his shoe, he nodded and walked away rather than asking the teacher to help him. It appeared shortly after that the student had problems with tying shoes but got them fixed with a help of another student. Students at the Public Montessori School were responsible for setting up their technology equipment and when facing problems with their iPads, they most often first asked other peers for help. On the contrary, a teacher at the Public Conventional School was observed placing chrome books on students' desk and when students encountered problems with for example sound, they would ask the teacher for help. These observations confirm survey's findings associated with teacher's answers revealing that students at the Public and Private Montessori when facing a problem would try to solve it by themselves or with help of peers while students at the Public Conventional School would initially seek help from adults.

4. Conclusion

In light of high school student drop out rates and the manner in which contemporary society is set up, addressing students' behavioral engagement as early as the elementary level becomes crucial in providing students with environments that foster learning, development of transferable skills, as well as a positive sense of being a part of a community. This study shows a significant difference among students attending these three different types of school in the On/Off Task assessments, the episodes of Non-Academic engagement, and the mean of teachers' answers to survey items. Students who attended the Public and Private Montessori Schools engaged in a greater number of On Task episodes than students who attended the Public Conventional School. Students who attended the Public Conventional School engaged in a greater number of Non-Academic episodes when compared to students who attended the Public and Private Montessori Schools. Based on the teachers' answers to survey items, this study shows that students at the Public and Private Montessori Schools exhibited more advanced transferable skills when compared to transferable skills exhibited by students at the Public Conventional School by 1 to 3 levels. In terms of qualitative data, this study also finds differences across these three types of schools in the quality of students' participation (intensity and complexity), tools of engagement (learning, environment, adults, technology) and students' level of passivity (classroom structure and peers).

   Therefore, this study demonstrates that alternative schools, such as Montessori, do foster students' behavioral engagement more effectively and ultimately provide for a greater development of transferable skills.

   Research reveals and this study confirms that child-centered classrooms provide for a greater level of student engagement possibly due to more positive teacher-student relationships. It is also possible that students at child-centered classrooms participate at a greater proportion, complexity, and intensity in class work than students in more traditional educational settings do because alternative curricula provides more opportunities to develop higher levels of competency. Further research exploring these findings could greatly expand on our understanding of the benefits associated with educational setups guided by a child-centered model.

5. Acknowledgments

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