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Abstract
This study analyzes the value learners, facilitators, and parents of a New Tech Network (NTN) High School place on various fundamental aspects about learning and teaching based on digital collaborative learning projects as a way to educate all learners to be college and career ready. It is a study conducted in New Tech Odessa High School (NTO), a learning organization located in the State of Texas, USA, where the instructional approach is project-based learning (PBL) in a digital environment. The data were collected using three questionnaires, and were analyzed through descriptive and inferential statistics. Findings suggest that the positive, student-centered, collaborative learning environment provided by PBL at NTO, along with the school culture and the seamless use of technology engage learners and foster deeper learning.

Resumen
Este estudio analiza la valoración que estudiantes, facilitadores y padres de un instituto de la red New Tech Network (NTN) otorgan a varios aspectos fundamentales del aprendizaje basado en proyectos (PBL) en un entorno digital colaborativo, como forma de preparar a los estudiantes para las exigencias formativas del mundo actual. Se trata de un estudio realizado en New Tech Odessa High School (NTO), una organización que aprende ubicada en el estado de Texas, Estados Unidos. Los datos se obtienen a través de tres cuestionarios y se analizan mediante estadística descriptiva e inferencial. Los resultados sugieren que el ambiente de aprendizaje positivo, colaborativo, centrado en el estudiante que proporciona el PBL, unido a la cultura de la escuela y al uso continuo de la tecnología involucra a los estudiantes y fomenta un aprendizaje más profundo.

Keywords
Project based learning; Learning organization; Digital environment; Technology-based environment; Educational technology; Deeper learning; 21st century skills.

Palabras clave
Aprendizaje basado en proyectos; Organización que aprende; Entorno digital; Ambiente de aprendizaje basado en la tecnología; Tecnología educativa; Aprendizaje más profundo; Habilidades del siglo XXI.

1. Introduction

Nowadays, we live in a global fast changing world surrounded and driven by technology; by teaching learners how to collaborate, to think critically, to solve real-world problems, to communicate, to have a growth mindset and to use technology as a tool we are preparing them for the highly competitive world of tomorrow.

Twenty-first-century expectations require twenty-first century learning. We often hear that educational systems are substantially slow to innovate, and that education today faces several critical gaps (Fullan, 2011). The fact is that innovation flourishes everywhere; the world around us is rapidly advancing when it comes to technology, and knowledge-based economies are growing and expanding. Today's students have grown up completely immersed in technology, innovations and large amounts of information; this makes their abilities, demands, and needs completely different from those of former generations. In addition to conceptual knowledge, students need to learn skills to become problem-solvers, innovators, and producers. Therefore, fundamental changes in education are not only necessary, but also inevitable. Knowledge transmission is no longer the only objective; education has to promote creativity, reasoning and problem solving skills at a higher level.

New Tech Odessa High School (NTO), as a learning organization, embraces an innovative pedagogy: networked computer assisted PBL instruction. This constructivist educational approach, along with an effective, professional, collaborative school learning culture, is designed to develop deeper learning: master core academic content, critical thinking, problem solving, growth mindsets, communication and collaboration skills to prepare students to thrive and succeed in post-secondary education, career and civic life of the 21st century global economy. At NTO, learning is a means to an end, not an end in itself. Learners are encouraged and motivated to move from a passive role to become active participants in creating, self-directing and self-assessing their own learning and understanding. Facilitators and administrators participate in comprehensive professional development, and receive coaching and training to learn and guide the students' learning, and therefore, teach them how to become lifelong learners.

The main objective of this study is to analyze the value that learners, facilitators, and parents of NTO High School confer to various fundamental aspects about learning and teaching based on digital collaborative learning projects as a way to educate all learners to be college and career ready.

2. Theoretical framework

2.1. Deeper learning: 21st Century skills to achieve college and career readiness

As defined by the National Research Council committee of experts in education, psychology and economics, deeper learning is the process by which a person becomes capable of acquiring what he has learned in a particular situation and applies it to a new situation; this process is also called *transfer* (NRC, 2012). It is a process that is linked to learning and acquisition of competencies (knowledge and skills) of the 21st century; that is, through deeper learning process, students develop knowledge and *transferable* skills. Evidence from international studies clearly shows that deeper learning produces high academic achievement. Assessments, studies and reports by the Organization for Economic Cooperation and Development (OECD), the leading international organization in the most developed nations of the world, support the effectiveness of deeper learning. A prime example comes from the results of the Program for International Student Assessment (PISA) which every three years measures fifteen years old students' knowledge, and their ability to apply such knowledge to real world situations (Alliance for Excellence in Education, 2011).

US major private companies have created organizations and foundations dedicated to collaborate in researching and investing in improving the education system in the nation such

as: the Partnership for 21st Century Skills, the Bill and Melinda Gates Foundation, the National Academy Foundation, the Oracle Education Foundation, the Board Education Foundation, the Walton Family Foundation, KnowledgeWorks Foundation and the William and Flora Hewlett Foundation.

The Partnership for 21st Century Skills, in order to help educators integrate 21st century skills in teaching basic academic content, has developed a collective vision for learning known as the Framework for 21st Century Learning. This framework describes how specific skills, such as: critical thinking, problem solving, communication and collaboration, should be integrated in the teaching of academic content of core subjects. Skills that students must learn to be better prepared and have success in life and work. At the same time, the integration of these skills would not be possible without the help of innovative support systems (i.e., standards and assessments, curriculum and instruction, professional development and learning environments) that have to be created to help students master the multidimensional skills they are required to learn.

Subsequently, the William and Flora Hewlett Foundation defined Deeper Learning as "*an umbrella term for the skills and knowledge that students must possess to succeed in 21st century jobs and civic life. At its heart is a set of competencies students must master in order to develop a keen understanding of academic content and apply their knowledge to problems in the classroom and on the job*" (William and Flora Hewlett Foundation, 2013, p. 2). Additionally, based on recent research (Chow, 2010; Trilling, 2010), the foundation identifies six competencies for Deeper Learning to prepare students to achieve high levels of success in their educational and professional future:

- Master core academic content.
- Think critically and solve complex problems.
- Work collaboratively.
- Communicate effectively.
- Learn how to learn.
- Develop academic mindsets.

The inclusion of academic mindsets to the Framework for 21st Century Learning adds the missing motivational component that influences the student engagement in learning. Most education reforms focus on the curriculum and pedagogy, that is, on what is taught and how it is taught. However, research shows that an essential part is missing: the psychological or non-cognitive factors. Educators, psychologists and even economists recognize the importance of non-cognitive factors in relation to both academic and work performance (Duckworth and Seligman, 2005; Heckman, J.J., Stixrud, J., and Urzua, S., 2006). To learn successfully students need a certain way of thinking about themselves and about the school, and must be able to find ways to regulate themselves to encourage learning; this is called the psychology of the student. Non-cognitive factors are what researchers call motivational psychology; encouraging self-regulation strategies and academic minds we achieve motivated students (Dweck et al., 2011). Hence, academic mindsets are "*the psycho-social attitudes or beliefs one has about oneself in relation to academic work*" (Farrington et al., 2012, p. 9) that will determine in many cases whether students will get engaged or not in the learning process.

Psychological research conducted by Dweck and her colleagues from Stanford University (2011) studied two types of academic mindsets: the fixed mindset and the growth mindset. This research showed how:

Two students, each with high academic ability, can have markedly different responses to frustration, with one relishing the opportunity to learn and the other becoming demoralized and giving up … Such responses, in turn, affect students' ability to learn over the long term … non-cognitive variables are critical for sustained levels of academic success … these variables include students' beliefs about themselves, their goals in school, their feelings of social belonging, and their self-regulatory skills. All contribute to tenacity and academic performance. (p. 6).

NTO learners develop deeper learning and a growth mindset through PBL and an effective school culture that reinforces the message that they belong to the NTO family. As part of the school culture is the constant reminder that with effort and perseverance all of them have the potential to grow and excel.

2.2. Project based learning in a digital environment

The focus of PBL is on learners who learn the subject content from completing a project. Learners at NTO become active constructors of their own knowledge, in a digital collaborative environment similar to the real world, the place where they will have to apply such knowledge and learning experiences in the near future.

Researchers have shared many definitions and descriptions for this innovative learning approach:

> "*Project-Based Learning (PBL) is an innovative approach to learning that teaches a multitude of strategies critical for success in the twenty-first century…. PBL is a student-driven, teacher-facilitated approach to learning…. PBL is a key strategy for creating independent thinkers and learners*" (Bell, 2010, p. 39).

> "*Project-based learning can be described as student-centered instruction that occurs over an extended time period, during which students select, plan, investigate and produce a product, presentation or performance that answers a real-world question or responds to an authentic challenge. Teachers generally serve as facilitators, providing scaffolding, guidance and strategic instruction as the process unfolds*" (Holm, 2011, p.1).

The main characteristics that a project has to include in order to be considered a true example of PBL are the following:

- It is intended to teach significant content.
- It requires critical thinking, problem solving, collaboration, and various forms of communication.
- It requires inquiry as part of the process of learning and creating a new thing.
- It creates a need to know fundamental content.
- It allows learners to have a degree of voice and choice.
- It includes some processes for revision and reflection.
- It involves a public audience (Larmer, J., Mergendoller, J. R., 2010).

At NTO, PBL has an important characteristic to add to the above list, which is:

- It uses seamlessly technology.

Today students often attribute their lack of interest to the little relevance and connection their subjects have to the real world. Due to its characteristics, PBL promotes a learning environment that makes students take responsibility for their own learning, and fosters learning focused on real problems. This helps motivate students to think deeply on the contents they are learning, and improves their academic performance. Being a student who directs himself implies that the individual identifies knowledge gaps about the project that is being carried out, generates a plan to remedy those deficiencies through appropriate resources, applies, and evaluates results in the context of the problem to solve (Ram and Leake, 1995). PBL provides opportunities for self-learning and self-assessment.

Although many teachers implement PBL in their classrooms without the use of technology, one of the best ways to motivate students in learning is to make sure that they will always have access to a computer connected to the Internet. Once students learn that they do not have to wait for the teacher to learn something, and instead, they can find their own answers on the

Web, they become curious and eager to explore and discover. Technology is a powerful tool for communication, collaboration, publication and distribution; all needed to support a facilitator or a learner in a PBL environment. However, while most of the students are experts in social applications and digital games, often they do not have the skills to use computers productively; therefore, this gives facilitators an opportunity to scaffold.

2.3. Educational technology and digital learning: Echo

Even though, we cannot imagine our lives, work and entertainment without technology, our schools are way behind when it comes to integrating educational technology in the classroom. Many students spend the whole school day sitting at desks, consuming content in textbooks. They are bored and lack motivation because our education system is still outdated and does not engage the new generation students.

Political leaders, educational and business communities in countries around the world have recognized the imperative to prepare their youth for the twenty-first century. This is a goal that many believe requires a fundamental transformation of educational opportunities, and the integration of technology in teaching and learning (Ananiadou and Claro, 2009).
The Alliance for Excellent Education (AEE, 2012) defines digital learning as:

> "*Any instructional practice that effectively uses technology to strengthen a student's learning experience. Digital learning encompasses a wide spectrum of tools and practices, including, among others, online and formative assessment; an increase in the focus and quality of teaching resources and time; online content and courses; applications of technology in the classroom and school building; adaptive software for students with special needs; learning platforms; participation in professional communities of practice; and access to high-level and challenging content and instruction*" (p. 3).

Through digital learning all students can learn at their own pace and in their own way because education can be customized, personalized, connected, and provide one-on-one instruction to meet diverse student needs. Thus, digital learning promotes deeper learning. Since students learn more and teachers have access to new tools and skills schools become more productive.

Digital learning is not learning between the student and an electronic device connected to the Internet; it is a triangulation of learning between teacher, learner and an electronic device. There is a common perception that teachers are "*anti-technology*," but surveys conducted by the Leading Education by Advancing Digital commission (LEAD) indicate that 96% of teachers believe that integrating technology into the teaching-learning process is important for the education of students. However, only 18% of teachers believe they are receiving the necessary training to use technology in the classroom to their full potential (LEAD, 2013).

For technology to be deployed successfully in the classroom teachers need to be trained to use it effectively and at the same time, they must have an orientation to know which is the right way to go to successfully implement ICT in the process of teaching and learning. The challenge is to understand the emerging educational context and how to create environments that facilitate the development of higher order cognitive skills and encourage these environments to thrive in what is known as the digital age.

In order to foster the digital literacy skills, NTO learners have a personal laptop Apple MacBook Pro. In 2012, NTO was chosen one of the *Apple Distinguished* schools for excellence in education; becoming part of the 87 schools in the country that have the honor to belong to this exclusive group.

As in the real world, NTO students use technology in all their courses. Students have the capability of using a video camera to record images for a presentation, editing a movie in iMovie, or creating a short digital animation using Flash. Students incorporate technology into everything they do. All activities, assignments, and resources needed to create and develop

their projects are on Echo, a powerful learning management system (LMS) delivered as a web-based service, an integrated online tools set that is accessible 24/7 via any web browser with an Internet connection, provided by NTN to all the network schools. Echo has been designed to facilitate communication and collaboration among facilitators, learners and parents, and to improve the teacher practice. Echo is used on a daily basis at New Tech high schools. Through a facilitator, learner or parent account one can access course project plans, agendas, course resources, tasks, activities, a multidimensional gradebook, online groups, and a library where facilitators can find instructional resources. Also, Google Apps for Education is seamlessly integrated into the LMS.

Echo covers many instructional needs for PBL instruction and assessment practices; facilitators have access to a large amount of exemplary projects. Consequently, Echo constitutes an integral element of New Tech Network's continuous professional development programs (www.newtechnetwork.org).

2.4. School learning culture

When talking about the school culture we mean the set of norms, values, beliefs, ceremonies, rituals, symbols and expectations that make up the personality or character of the school. The school culture is built with time, work consistency, and the collaboration of all members of the educational community, i.e., administrators, teachers, students, parents, and other staff of the school. The culture of an organization plays an important role for exemplary performance (Deal and Peterson, 1999).

An effective, democratic and collaborative learning culture is achieved when a school meets certain requirements like: having a clear vision and mission as it relates to educational quality and efficiency; having a widely shared sense of purpose and values (Stein, 1998); establishing standards for continuous learning and improvement (Lambert, 1998); being a place where both teachers and learners learn (Rosenholtz, 1989); generating high expectations for everyone (Deal y Peterson, 1990); encouraging teachers to collaborate with each other and with the school administrators to teach students and, thus, learn more (Fullan, 1993); promoting commitment and sense of responsibility for the learning of all students (Fullan, 2001); having a strong leadership, not a rigid one (Deal y Peterson, 1990); providing staff with opportunities for reflection, research and sharing collective individual practices (Hord, 1998).

At NTO daily routines are connected to the school mission, core values (trust, respect and responsibility), and purpose; therefore, these routines become rituals. Every student and every teacher should behave according to the school core values. Those core values lead and establish the basis of the behavior and coexistence of all the NTO's family members.

NTO has a positive school culture with a general emphasis on learning, not only in teaching. It is all about learning, growth and development of each individual in the organization. Both teachers and students are responsible and owners of their own learning experience, and of the school environment. To work on projects and in teams, students are accountable to their peers, and acquire a similar level of the responsibility they would experience on a professional working environment. At the same time, the continuous training of teachers and principals is an essential factor that results in improved student teaching. A learning organization promotes a culture of change in the practices of teaching and learning oriented towards greater collaboration between learners, teachers and other potential partners (Fullan, 1993).

Another important factor to note is that at NTO one sees leadership, primarily as a function and not as a job. That is, the principal of NTO has the main function of creating, promoting and refining the symbols and symbolic activities that give meaning to the organization (Deal and Peterson, 1999). The performance of her function is crucial in shaping the school culture.

NTN/NTO believe that a positive school culture is one that connects, involves and challenges each student. Hence, the culture of NTO creates a positive school environment, which refers to the quality of a school that encourages the creativity of its teachers and students, enthusiasm,

sense of belonging (Freiberg and Stein, 1999); and also colleague relationships (Reinhartz and Beach, 2004). All this deeply contributes to higher student academic achievement, higher levels of understanding and skill development compared to traditionally organized centers (Darling-Hammond, 1997).

3. Method

This research is based on a case study that combines two methods: quantitative method (electronic questionnaires) and qualitative method (in-depth discussions and interviews with experts). The combination of both methods not only contributes to ensure the quality of the data, but to reach a deeper understanding of the studied phenomenon. It also allows data triangulation, which provides rigor, depth, and consistency to the findings (Patton, 2002).

This article focuses on the participants, data collection, analysis, and results of the quantitative method.

3.1. Participants/study populations and samples

The populations of this study are the NTO learners (N=355), facilitators (N=29), and parents that access Echo on a regular basis (N=54) of the academic year 2013-14. The samples obtained were:

⇒ Learners (n=227)
Gender: Female 135 (59%), male 92 (41%).
Grade and Age:
- 9th (14 to 15): 66 (29%)
- 10th (15 to 16): 57 (25%)
- 11th (16 to 17): 45 (20%)
- 12th (17 to 18): 59 (26%)

⇒ Facilitators (n=29)
Gender: Female 18 (62%), male 11 (38%).
Age:
- 18 to 24: 6 (21%)
- 25 to 34: 15 (52%)
- 35 to 44: 5 (17%)
- 45 to 54: 3 (10%)

⇒ Parents (n=53)
Gender: Female 45 (85%), male 8 (15%).
Age:
- 25 to 34: 8 (15%)
- 35 to 44: 25 (47%)
- 45 to 54: 15 (28%)
- 55 to 64: 5 (9%)

3.2. Data collection and analysis

In May 2014, three online questionnaires with a 5-point Likert scale that ranged from 1 (not important) to 5 (extremely important) were administered to NTO learners (16 items), facilitators (22 items), and parents (14 items) using Google Forms, a web-based tool. An e-mail was sent up to four times through their Echo accounts; each e-mail included a communication explaining the objective of the study and a link to the questionnaire.

Descriptive statistics were used to calculate the frequency, percentage, standard deviation and differences coefficient; and inferential statistics were used to do non-parametric test of Chi-square, contingency tables, correlation and factorial analyses.

The questionnaires validity, internal consistency and reliability were obtained through consulting some experts in the field, and determining the Cronbach's alpha coefficient, Barlett's test of sphericity and a Kaiser-Meyer-Olkin measure of sampling adequacy.

Table 1.
Questionnaires Validity, Internal Consistency and Reliability

Questionnaire	Standarized Cronbach's Alpha	KMO Index	Bartlett's Test
Learners	.946	.939	.000
Facilitators	.893	.605	.000
Parents	.921	.789	.000

The data obtained (table 1) indicate that the learners and parents questionnaires had excellent internal consistencies (α ≥ 0.9), and the facilitators questionnaire had a good consistency (α ≥ 0.8). Likewise, the results obtained from the Bartlett's sphericity tests ($p<0.05$), and from the KMO indexes with all values >0.5 showed that we could reject the null hypothesis that the correlation matrix is an identity matrix, and factorize effectively the original variables.

Consequently, the principal component analysis (PCA) was adopted as a dimension reduction technique to obtain the set of factors that best summarize the information available in the data.

4. Results

The tables of communalities (tables 2, 4 and 6) show how much of the variance in the variables has been accounted for by the extracted factors. For instance, in table 2, 73.8% of the variance in *the effectiveness of PBL to achieve college readiness* is accounted for.

Table 2.
Communalities. Learners questionnaire.

Communalities		
	Initial	Extraction
Your learning experience at NTO as a PBL High School	1.000	.718
PBL versus traditional learning	1.000	.481
The school culture and its importance of vision and mission as it relates to school quality and effectiveness	1.000	.663
The incidence of non-cognitive skills on your learning outcomes	1.000	.607
The digital collaborative learning environment	1.000	.716
The importance of learning 21st century skills	1.000	.738
The influence of PBL in improving your communication skills	1.000	.615
The influence of Literacy Tasks and CRAs in the improvement of your writing skills	1.000	.439
The importance of learning critical thinking	1.000	.556
The effectiveness of PBL to achieve college readiness	1.000	.738
The collaboration, teamwork, and family culture among your peers	1.000	.684
The relationships with your facilitators	1.000	.581
The sense of belonging among the NTO family	1.000	.688

The role of technology in PBL	1.000	.699
Echo as a digital LMS …	1.000	.607
The technical assistance at NTO	1.000	.456

Tables 3, 5 and 7 show all the factors extractable from the analysis along with the eigenvalues, the percentage of variance attributable per factor, and the cumulative variance of the factor and the previous one. In table 3, the first factor accounts for 55.708% of the variance and the second factor 6.703%. The remaining factors are less or non significant. The scree plot is useful for determining how many factors to retain.

Table 3.
Total variance explained. Learners questionnaire.

Total Variance Explained

Components	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	8.913	55.708	55.708	8.913	55.708	55.708	6.487	40.545	40.545
2	1.072	6.703	62.410	1.072	6.703	62.410	3.498	21.865	62.410
3	.960	6.002	68.412						
4	.869	5.430	73.843						
5	.567	3.545	77.387						
6	.551	3.442	80.830						
7	.477	2.979	83.809						
8	.432	2.700	86.509						
9	.371	2.321	88.829						
10	.337	2.106	90.936						
11	.296	1.849	92.785						
12	.286	1.787	94.571						
13	.257	1.607	96.179						
14	.235	1.470	97.648						
15	.203	1.269	98.917						
16	.173	1.083	100.000						

Scree Plot

Table 4.
Communalities. Facilitators questionnaire.

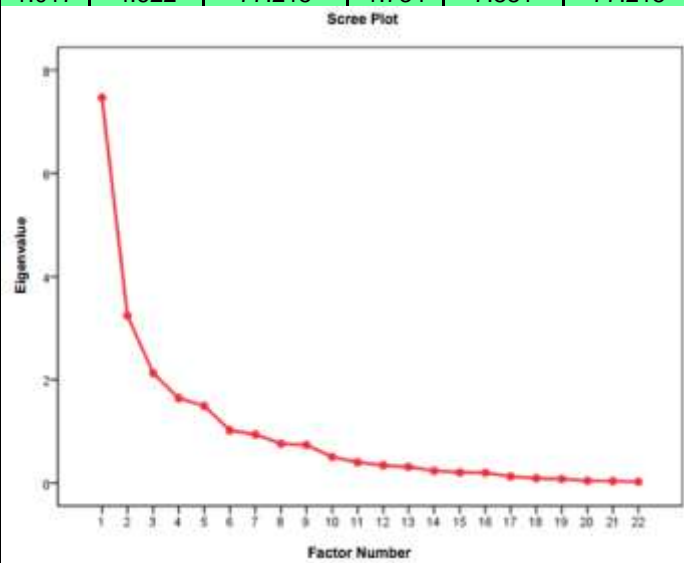| Communalities		
	Initial	Extraction
Your teaching experience at NTO	1.000	.746
PBL versus traditional learning	1.000	.680
PBL effectiveness in your content area	1.000	.772
Specific traditional strategies in your content area	1.000	.586
The school culture and its importance of vision and mission as it relates to school quality and effectiveness	1.000	.829
The incidence of non-cognitive skills on the learning outcomes	1.000	.850
The digital collaborative learning environment	1.000	.839

The importance of teaching 21st century skills	1.000	.744
The influence of PBL in improving the learners communication skills	1.000	.766
The influence of Literacy Tasks and CRAs in the improvement of your learners writing skills	1.000	.744
The importance of teaching critical thinking	1.000	.803
The effectiveness of PBL to achieve our learners college readiness	1.000	.801
The sense of belonging among the NTO family	1.000	.751
The collaboration. teamwork. and family culture among your colleagues	1.000	.841
The assistance and support for new facilitators to be successful	1.000	.780
The need of trainings in order to improve your teaching performance	1.000	.858
The importance of adult learning theory and sound practices for supporting adult learning	1.000	.866
The importance of Professional Learning Communities (PLCs)	1.000	.837
The role of technology in PBL	1.000	.755
The technical assistance at NTO	1.000	.663
The Network assistance	1.000	.731
Echo as a digital LMS …	1.000	.747

In table 5, six factors explain 77.215% of the total variance.

Table 5.
Total variance explained. Facilitators questionnaire.

Total Variance Explained

Components	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulativ e%
1	7.465	33.931	33.931	7.465	33.931	33.931	3.709	16.859	16.859
2	3.243	14.740	48.671	3.243	14.740	48.671	3.253	14.785	31.644
3	2.128	9.672	58.343	2.128	9.672	58.343	2.866	13.029	44.673
4	1.643	7.467	65.810	1.643	7.467	65.810	2.759	12.542	57.215
5	1.492	6.783	72.593	1.492	6.783	72.593	2.666	12.120	69.334
6	1.017	4.622	77.215	1.017	4.622	77.215	1.734	7.881	77.215
7	.935	4.251	81.467						
8	.759	3.452	84.919						
9	.735	3.341	88.260						
10	.504	2.293	90.553						
11	.400	1.817	92.370						
12	.341	1.552	93.922						
13	.310	1.410	95.333						
14	.235	1.067	96.400						
15	.204	.927	97.327						
16	.196	.889	98.216						
17	.125	.569	98.785						
18	.091	.415	99.200						
19	.075	.343	99.543						
20	.042	.189	9.732						
21	.035	.160	99.892						
22	.024	.108	100.000						

Scree Plot

Table 6.
Communalities. Parents questionnaire.

Communalities		
	Initial	Extraction
PBL versus traditional learning	1.000	.776
PBL effectiveness in your child's education	1.000	.838
The school culture and its importance of vision and mission as it relates to school quality and effectiveness	1.000	.737
The incidence of non-cognitive skills on your child's learning outcomes	1.000	.697
The digital collaborative learning environment	1.000	.870
The importance for your child to learn 21st century skills	1.000	.701
The influence of PBL in improving your child's communication skills	1.000	.760
The influence of Literacy Tasks and CRAs in the improvement of your child's writing skills	1.000	.837
The importance for your child to learn critical thinking	1.000	.945
The effectiveness of PBL to prepare your child for college	1.000	.683
The sense of belonging among the NTO family	1.000	.794
The role of technology in PBL	1.000	.732
The technical assistance at NTO	1.000	.752
Echo as a digital LMS …	1.000	.732

In table 7, three factors explain 77.527% of the total variance.

Table 7.
Total variance explained. Parents questionnaire.

Total Variance Explained

Components	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	7.096	50.686	50.686	7.096	50.686	50.686	4.605	32.894	32.894
2	2.489	17.776	68.462	2.489	17.776	68.462	3.387	24.196	57.090
3	1.269	9.065	77.527	1.269	9.065	77.527	2.861	20.436	77.527
4	.740	5.286	82.813						
5	.614	4.386	87.198						
6	.496	3.541	90.740						
7	.352	2.511	93.251						
8	.282	2.013	95.264						
9	.217	1.547	96.811						
10	.132	.943	97.753						
11	.110	.788	98.541						
12	.088	.626	99.167						
13	.064	.455	99.622						
14	.053	.378	100.000						

Scree Plot

Next, in order to make the interpretation of the analyses easier, we obtained the rotated component matrixes for the three questionnaires. The results showed the loadings of all the variables on the factors extracted; being suppressed all loadings <0.5. In short, after performing the factor analyses, the study of the content questions, and the context for the study, the common themes identified were:

- Learners Questionnaire (LQ): NTO/PBL Experience (2 items); New Pedagogy: NTO Culture and Deeper Learning (11 items); and Technology/Echo (3 items).
- Facilitators Questionnaire (FQ): NTO/PBL Experience (4 items); New Pedagogy: NTO Culture and Deeper Learning (10 items); Professional Learning Needs (4 items), and Technology/Echo (4 items).
- Parents Questionnaire (PQ): NTO/PBL Experience (2 items); New Pedagogy: NTO Culture and Deeper Learning (9 items); and Technology/Echo (3 items).

Considering that the 5-Likert scale ranges are: 1 (not important), 2 (of little importance), 3 (somewhat important), 4 (important), and 5 (extremely important), we examine through variable frequency graphs, the results of the following fundamental aspects:

> **PBL versus traditional learning (V1)**
- Learners Questionnaire (224 valid answers).

1	6	2.6%
2	18	7.9%
3	47	20.7%
4	79	34.8%
5	74	32.6%

Fig. 1. LQ. V1 Frequency.

- Facilitators questionnaire (29 valid answers).

1	0	0%
2	1	3.4%
3	6	20.7%
4	13	44.8%
5	9	31%

Fig. 2. FQ. V1 Frequency.

• Parents questionnaire (49 valid answers).

1	0	0%
2	4	7.5%
3	8	15.1%
4	16	30.2%
5	21	39.6%

Fig. 3. PQ. V1 Frequency

➢ **The school culture and its importance of vision and mission as it relates to school quality and effectiveness (V2).**

• Learners Questionnaire (224 valid answers).

1	9	4%
2	8	3.5%
3	56	24.7%
4	77	33.9%
5	74	32.6%

Fig. 4. LQ. V2 Frequency.

• Facilitators questionnaire (29 valid answers).

1	0	0%
2	0	0%
3	2	6.9%
4	10	34.5%
5	17	58.6%

Fig. 5. FQ. V2 Frequency.

• Parents questionnaire (51 valid answers).

1	1	1.9%
2	0	0%
3	5	9.4%
4	18	34%
5	27	50.9%

Fig. 6. PQ. V2 Frequency.

➢ **The incidence of non-cognitive skills (trust, respect, responsibility, growth mindset, etc.) on the students learning outcomes (V3).**

• Learners Questionnaire (224 valid answers).

1	7	3.1%
2	8	3.5%
3	45	19.8%
4	95	41.9%
5	69	30.4%

Fig. 7. LQ. V3 Frequency.

• Facilitators Questionnaire (29 valid answers).

1	0	0%
2	1	3.4%
3	4	13.8%
4	10	34.5%
5	13	44.8%

Fig. 8. FQ. V3 Frequency.

• Parents questionnaire (49 valid answers).

1	1	1.9%
2	0	0%
3	3	5.7%
4	13	24.5%
5	32	60.4%

Fig. 9. PQ. V3 Frequency.

➢ **The digital collaborative learning environment (V4).**
• Learners Questionnaire (223 valid answers).

1	2	0.9%
2	5	2.2%
3	42	18.5%
4	87	38.3%
5	87	38.3%

Fig. 10. LQ. V4 Frequency.

• Facilitators Questionnaire (29 valid answers).

1	0	0%
2	1	3.4%
3	5	17.2%
4	16	55.2%
5	7	24.1%

Fig. 11. FQ. V4 Frequency.

• Parents Questionnaire (51 valid answers).

1	1	1.9%
2	1	1.9%
3	7	13.2%
4	17	32.1%
5	25	47.2%

Fig. 12. PQ. V4 Frequency.

➤ **The importance of learning 21st century skills (V5).**
• Learners questionnaire (222 valid answers).

1	2	0.9%
2	1	0.4%
3	20	8.8%
4	68	30%
5	131	57.7%

Fig. 13. LQ. V5 Frequency.

• Facilitators questionnaire (29 valid answers). Rating:

1	0	0%
2	0	0%
3	2	6.9%
4	8	27.6%
5	19	65.5%

Fig. 14. FQ. V5 Frequency.

• Parents questionnaire (50 valid answers).

1	0	0%
2	0	0%
3	1	1.9%
4	10	18.9%
5	39	73.6%

Fig. 15. PQ. V5 Frequency.

➢ **The influence of PBL in improving the learners' communication skills (V6).**
• Learners questionnaire (222 valid answers).

1	9	4%
2	7	3.1%
3	41	18.1%
4	78	34.4%
5	87	38.3%

Fig. 16. LQ. V6 Frequency.

• Facilitators Questionnaire (29 valid answers).

1	1	3.4%
2	1	3.4%
3	4	13.8%
4	8	27.6%
5	15	51.7%

Fig. 17. FQ. V6 Frequency.

• Parents questionnaire (49 valid answers).

1	1	1.9%
2	2	3.8%
3	3	5.7%
4	12	22.6%
5	31	58.5%

Fig. 18. PQ. V6 Frequency.

➢ **The effectiveness of PBL to achieve college and career readiness (V7).**
• Learners questionnaire (223 valid answers).

1	8	3.5%
2	14	6.2%
3	36	15.9%
4	74	32.6%
5	91	40.1%

Fig. 19. LQ. V7 Frequency.

• Facilitators questionnaire (29 valid answers).

1	0	0%
2	1	3.4%
3	6	20.7%
4	13	44.8%
5	9	31%

Fig. 20. FQ. V7 Frequency.

• Parents questionnaire (51 valid answers).

1	1	1.9%
2	1	1.9%
3	4	7.5%
4	12	22.6%
5	33	62.3%

Fig. 21. PQ. V7 Frequency.

➢ **The role of technology in PBL (V8).**
• Learners questionnaire (223 valid answers).

1	5	2.2%
2	3	1.3%
3	34	15%
4	75	33%
5	106	46.7%

Fig. 22. LQ. V8 Frequency.

• Facilitators questionnaire (29 valid answers).

1	0	0%
2	0	0%
3	2	6.9%
4	13	44.8%
5	14	48.3%

Fig. 23. FQ. V8 Frequency.

• Parents questionnaire (50 valid answers).

1	0	0%
2	1	1.9%
3	1	1.9%
4	12	22.6%
5	36	67.9%

Fig. 24. PQ. V8 Frequency.

➢ **Echo, as a digital learning management system, designed to support, facilitate communication and collaboration (V9).**

• Learners questionnaire (224 valid answers).

1	4	1.8%
2	4	1.8%
3	44	19.4%
4	72	31.7%
5	100	44.1%

Fig. 25. LQ. V9 Frequency.

• Facilitators questionnaire (29 valid answers).

1	0	0%
2	1	3.4%
3	4	13.8%
4	10	34.5%
5	14	48.3%
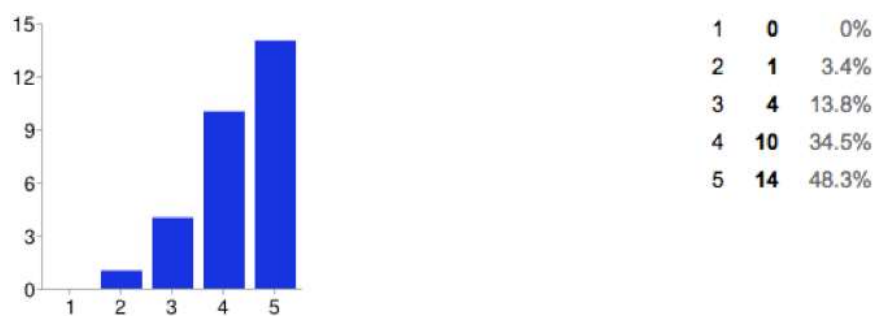
Fig. 26. FQ. V9 Frequency.

• Parents questionnaire (50 valid answers).

1	3	5.7%
2	1	1.9%
3	5	9.4%
4	16	30.2%
5	25	47.2%

Fig. 27. PQ. V9 Frequency.

➢ **The need of trainings in order to improve your teaching performance (V10).**
• Facilitators questionnaire (29 valid answers).

1	0	0%
2	0	0%
3	3	10.3%
4	12	41.4%
5	14	48.3%

Fig. 28. FQ. V10 Frequency.

➢ **The importance of adult learning theory and sound practices for supporting adult learning (V11).**
• Facilitators questionnaire (29 valid answers).

1	0	0%
2	6	20.7%
3	7	24.1%
4	8	27.6%
5	8	27.6%

Fig. 29. FQ. V11 Frequency.

➢ **The importance of Professional Learning Communities (PLCs) (V12).**
• Facilitators questionnaire (29 valid answers).

1	5	17.2%
2	7	24.1%
3	9	31%
4	6	20.7%
5	2	6.9%

Fig. 30. FQ. V12 Frequency.

5. Discussion

The information obtained by the data of the three questionnaires study demonstrates that at NTO:

⇒ Learners, facilitators and parents prefer PBL versus traditional learning.

⇒ The majority of learners, facilitators and parents rate as either *"extremely important"* or "*important*" aspects such as: the school culture and its importance of vision and mission as it relates to school quality and effectiveness, the incidence of non-cognitive skills (trust, respect, responsibility, growth mindset, etc.) on the students learning outcomes, the digital collaborative learning environment, the importance of learning 21st century skills, the influence of PBL in improving the learners' communication skills, the effectiveness of PBL to achieve college and career readiness, the role of technology in PBL, and Echo, as a digital learning management system, designed to support, facilitate communication and collaboration.

⇒ Regarding professional development, NTO facilitators consider that in order to improve their teaching practices:

- Trainings are either "*extremely important*" or "*important*" (89.7%).
- Adult learning theory and sound practices for supporting adult learning are either "*extremely important*" or "*important*" (55.2%).
- Professional Learning Communities (PLCs) are not valued as high as the former: "*extremely important*" (6.9%) and "*important*" (20.7%).

Overall, the results of this study revealed that NTO learners, facilitators, and parents prefer PBL versus traditional learning when it comes to educate and prepare students to become professionals of the 21st century. These results clearly indicate how the participants recognize that aspects like the school culture, the digital collaborative learning environment, the non-cognitive skills, the learning of 21st century skills along with the seamless use of technology highly contribute to improve the students learning outcomes. NTO assesses five school wide learning outcomes: knowledge and thinking, written communication, oral communication, collaboration and agency.

The main purpose of assessing the results of student learning is to prepare them for the future. Regardless of whether they decide to attend college or not, they should know their options after high school. They should complete courses to meet the requirements to attend college, and should be prepared with the knowledge, skills and qualities needed to be successful. NTN shares the belief that schools should make every effort to ensure that all students achieve this level of preparation. At NTO, as a learning organization, this is an opportunity to learn how to improve instructional practices on a daily basis. However, to obtain the needed improvements requires time, continuous professional development and support from all the members of the NTO family.

Research should continue to refine the understanding of achieving deeper learning through PBL along with the importance of the school culture. Further research in the learning environment and the use of technology in larger high schools, where responses to practical challenges of this constructive and innovative teaching approach are needed.

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