Re-evaluating How We Evaluate Technology-related Professional Development Opportunities

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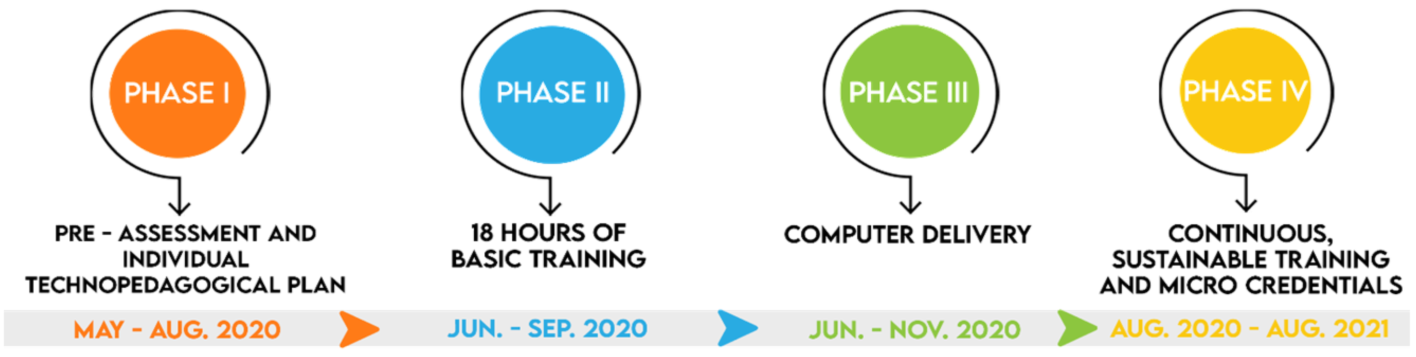
Abstract

As virtual education and jobs become the "new" reality, most professional development opportunities require technological skills. But how should we evaluate them? Usually, we measure the number of activities or contact hours offered, the number of participants, increased knowledge or skill, or their level of satisfaction. Unfortunately, what happens after is not commonly addressed. The follow-up question we are interested in responding to is: *how successful were these activities in promoting or improving significant uses of technology by the participants?* For example, fast-tracked by COVID-19, the Puerto Rico Department of Education (PRDE) implemented the DE-Innova project to train educators on various technological tools. It involved a needs assessment, which was also used to evaluate project achievements. The results of this implementation presented an opportunity to reflect on what elements should be contemplated when evaluating these kinds of projects, considering the evolving nature of technology.

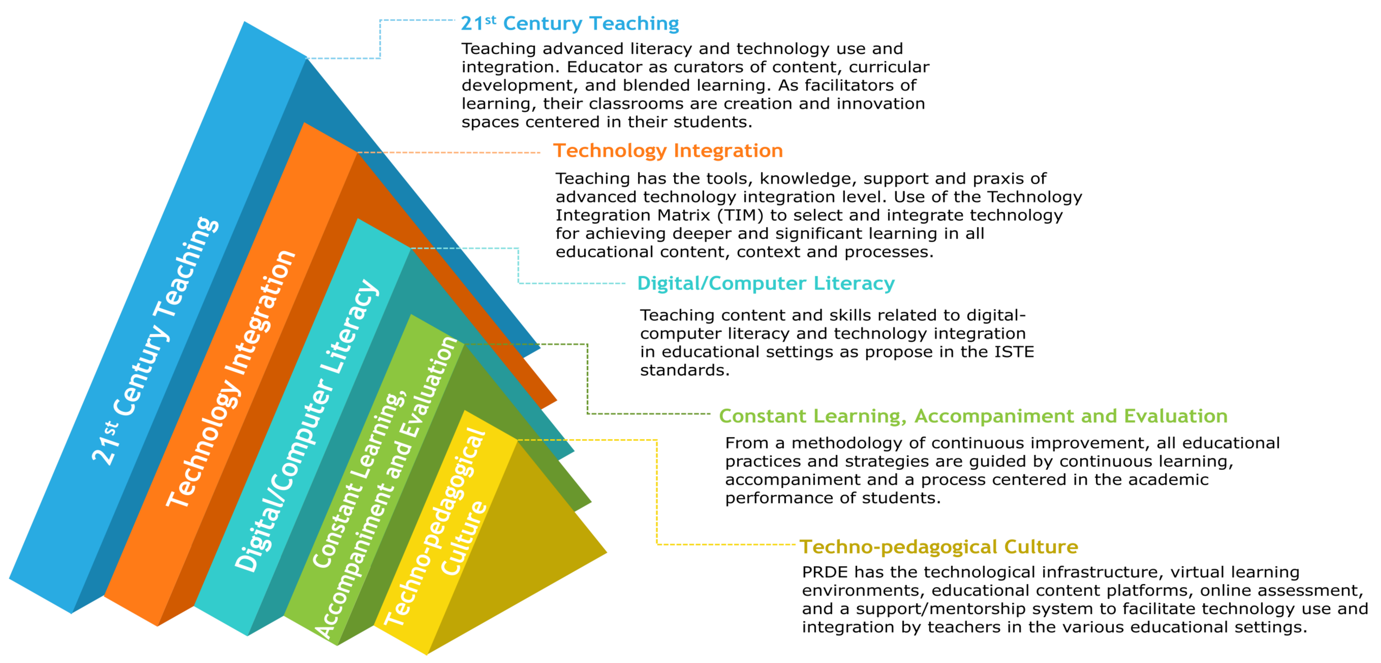
Background

When the COVID-19 pandemic began in 2020, unexpected outlooks on the various work scenarios worldwide were highlighted. In Puerto Rico, after a four-week lockdown, we moved abruptly from a traditional, face-to-face work culture to a remote work scenario. For educators, the challenge was even greater. Not only did they have to adapt their educational practices to virtual environments, but they had to deliver and assess learning using technological tools unknown by them and their students. Given this situation, during the summer 2020, the Puerto Rico Department of Education (PRDE) implemented the DE-Innova project, to provide educators and students with technological equipment, and adequate professional development opportunities in the use and integration of technology in their educational practice. The project consisted of the following:



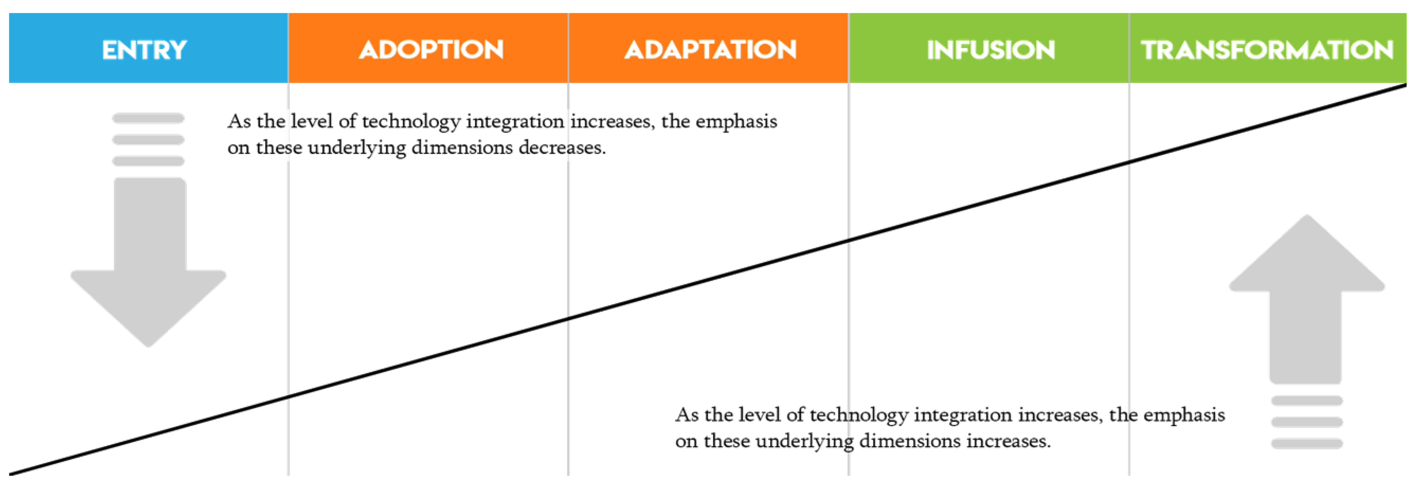
Project Theory

To design or adapt the assessment tool, we reviewed various tools that had been previously used in system-wide technology implementations. The ones with the most relevance was the Technological Pedagogical Content Knowledge Framework (TPACK), the Technology Integration Matrix (TIM), and the International Society for Technology Integration Standards for Educators (ISTE). Our goal was to find indicators to assess and determine perceived level of use and integration of technology by the educators in various levels in the public education system (grades kindergarten through twelfth) to use in Puerto Rico. The figure below shows the Framework proposed as part of the Project.



For this, Global Education Exchange Opportunities (GEEO) signed a Collaborative Agreement with the University of Florida's Center for Instructional Technology to use their on-line platform, translate, adapt, and administer their Technology Uses and Perceptions Survey (TUPS) based on the Technology Integration Matrix (TIM) for analysis. The TUPS is an assessment tool centered on educational praxis within the classroom.

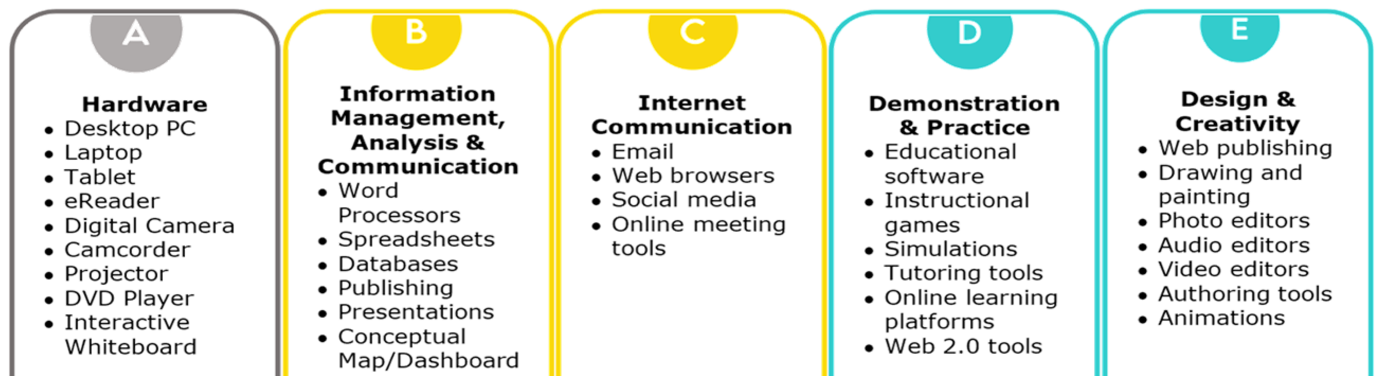
Educator responses were analyzed to identify the level of use and integration of technology in the classroom in a way that fosters significant learning. The process of teaching with technology can take place in any of the five TIM levels. It is essential to highlight that what causes progression from one level to another is the autonomy that teachers grant the students when using and integrating technology through their teaching: from dominating the selection and/or focusing on teaching how to use technology, to encouraging the student to know how to choose and use a variety of technologies. Therefore, the main objective of the professional development activities was to help educators "move" to higher level of technology integration in their professional practices.



Technology Uses and Perception Survey (TUPS)

Reliability of Subscales

The TUPS assessed thirty-two (32) technological tools. Participants reported their perception of usefulness, and skill level using each tool. Both scales included six alternatives: *None, Very Little, Little, Moderate, High, Very High.* To facilitate interpretation, the six alternatives were reduced to three categories: *Little* (which includes *None* and *Very little*), *Moderate* (which includes *Little* and *Moderate*), and *High* (which includes *High* and *Very high*). The 32 tools were classified into five subscales:



The thirty-two technology tools (equipment and software) were grouped based on both Norman Webb's depth of knowledge Taxonomy (DOK), and the TIM. The DOK is a framework that categorizes contexts, prompts, scenarios and challenges into four levels of rigor. For this study, the tools were grouped into five subscales from those requiring the least to highest teacher/student creation, application, synthesis ability.

A reliability analysis using Cronbach's Alpha was calculated after grouping tools in categories to construct the five subscales (refer to figure above). The first subscale ***Hardware*** included tools available for teachers and students which resulted in a α = .910 score. The second subscale ***Information Management, Analysis, and Communication*** with a α = .873 grouped tools used to organize, calculate, analyze, and generate conclusions or predictions based on data. The third subscale ***Internet Communication*** with a α = .875 grouped tools to facilitate communication and collaboration. The fourth subscale ***Demonstration and Practice*** are those used to repeat or respond to cues to learn content or demonstrate proficiency in a process, when grouped had a α =.873 score. The fifth scale ***Design and Creativity*** with a α =.946 score of includes design and creativity tools to require constructing or visualizing information granting students more autonomy for learning and teachers' greater creativity to design it.

Statistics		Subscales									
		A. Hardware		B. Information Management, Analysis and Communication		C. Internet Communication		D. Demonstration and Practice		E. Design and Creativity	
		PRE	POST	PRE	POST	PRE	POST	PRE	POST	PRE	POST
Skill level	Cronbach's Alpha	.910	.884	.873	.851	.875	.837	.906	.902	.946	.950
	Arithmetic Mean	32.57	37.68	18.56	22.49	16.62	19.82	13.34	17.77	13.53	18.06
	Scale Mean	2.64	3.19	2.10	2.75	3.19	3.95	1.20	1.96	0.91	1.58
Perceived Usefulness	Cronbach's Alpha	.952	.929	.947	.919	.913	.860	.953	.930	.975	.968
	Arithmetic Mean	39.19	37.85	24.68	23.28	18.23	19.21	22.96	21.08	24.65	22.57
	Scale Mean	3.39	3.27	3.15	2.88	3.59	3.80	2.87	2.51	2.55	2.17
Subscales	Num. of Items	9		6		4		6		7	
	Minimum value	9		6		4		6		7	
	Maximum value	54		36		24		36		42	

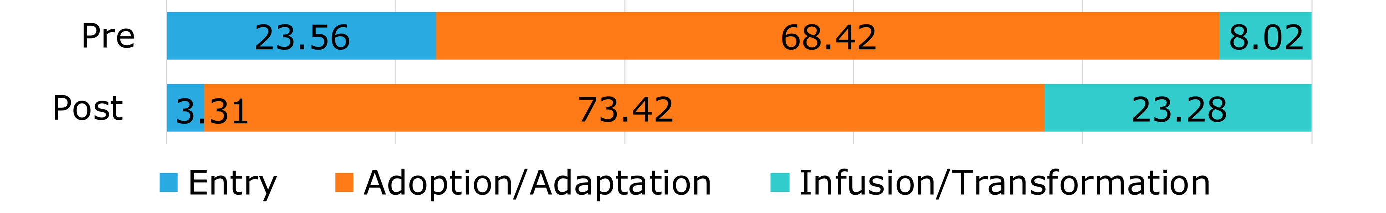
In summary, the subscales generated had a strong Cronbach score higher than .80. Therefore, there was a strong predictive validity within each of the five subscales allowing us to conclude the perceived use of the tools in the teaching and learning process.

Results

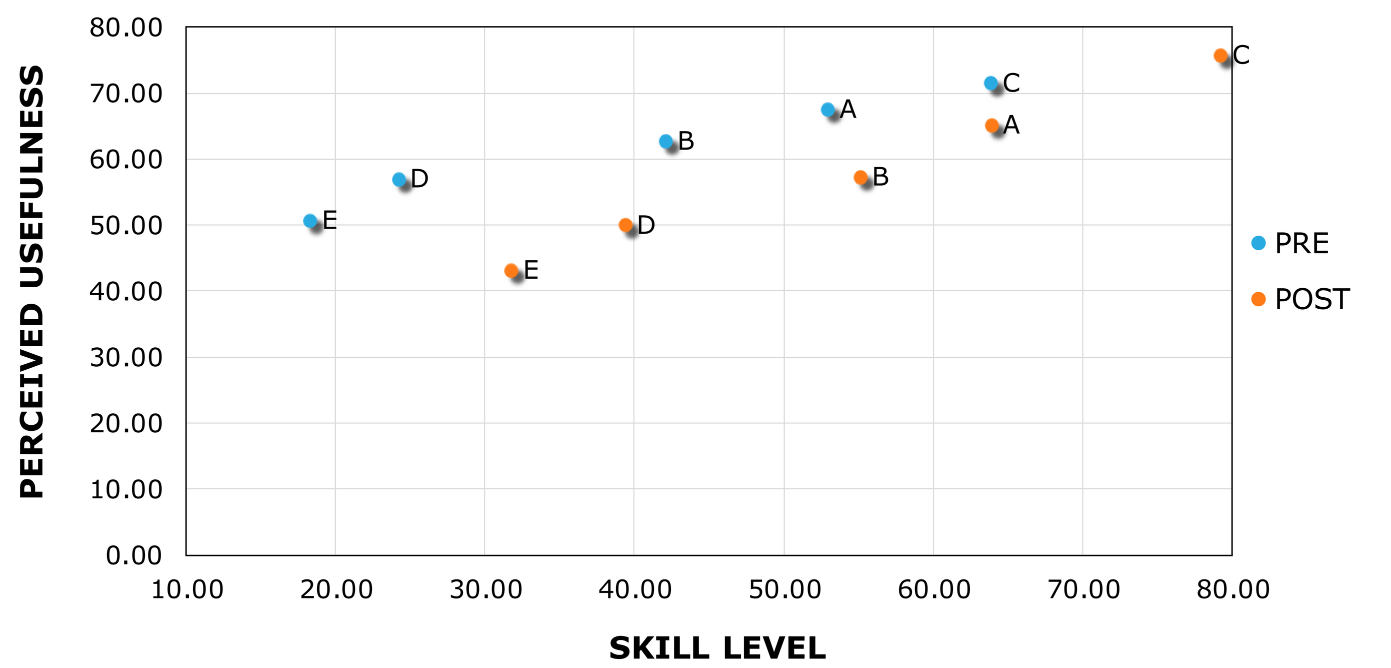
Participation Rates

Variable	Total from both administrations	Administration - Pre	Administration - Post	Eligible for Pre & Post Comparison
Population	26,150	24,952	26,144	23,432
Participants	24,721	23,436	20,562	19,272
Participation rate	94.54%	93.92%	78.65%	82.25%

As a result of the DE-Innova project, the percentage of participants that were classified as Entry level was reduced by 20.25%, while the percentage of participants in the Adoption/Adaptation and the Infusion/Transformation levels increased by 5% and 15.26%, respectively. Most participants remained in the same TIM level after the DE-Innova project (57.07%), while 37.57% moved up at least one TIM Level. Less than 6% move down one or two TIM levels (5.35%).



DE-Innova project participants indicated that, as their skills for different technological tools increased, they tended to perceive most tools as less useful (inverse relationship), except for those tools related to the *Internet Communication* subscale, which showed an increase in both skill levels and perceived usefulness. This could be due to classes having to be offered online, and teachers and students using communication software on the internet to teach during the Covid-19 pandemic.



Conclusions

The adaptation of the TUPS and further creation of subscales for the thirty-two technology tools was effective in identifying the baseline as well as the impact of the implementation in the perceived uses by the teacher as well as their perception of their student use in the sample. This goes beyond assessing the participants' satisfaction and increased knowledge after the professional development was provided. The subscales yielded information of the intended uses of technology by participants in their workplace academic environment, and a way to assess in a meaningful way how new or improved skills will be used. As well as what would be the gaps for planning future professional learning experiences for the teacher and their students.

Considerations for the evaluation of technology-related professional development opportunities

The Puerto Rico Department of Education project granted GEEO the opportunity to implement a robust evaluation of technology-related professional development in an educational setting. Nonetheless, this approach can be adapted to any professional field in which technology-related professional development opportunities are offered. Among the variables or aspects that should be included in the evaluation of these types of activities, are the following:

Variable	Instruments	Before activities (Pre)	After activities (Post)
Use of each tool in the workplace	Scale for the frequency of use	X	X
Perception of each tool's usefulness in the workplace	Scale for perception on tools' usefulness	X	X
Skill level (as self-assessed) (skill level scale)	Scale for skill level (Self-assessed)	X	X
Skill level (assessed by a third party)	Test, checklist, performance tasks	X	X
Satisfaction	Satisfaction questionnaire, interviews, focus groups	-	X

References

Florida Center for Instructional Technology (FCIT). (2019). *The Technology Integration Matrix.* TIM.

Global Education Exchange Opportunities, Inc. (2019). Framework; Uso e integración tecnológica en el campo de la educación.

Global Education Exchange Opportunities, Inc. (2021). *DE-INNOVA – GEEO | Global Education Exchange Opportunities.* https://www.geeopr.com/de-innova/#planindividual