Digital immigrants teaching digital natives
A call for a paradigm shift

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ABSTRACT

Societal changes and technological progress have changed the landscape of our society and have re-shaped the mindset of our students. Generally, majority of educators today are digital immigrants teaching digital native students. It is inevitable that teachers learn the language of our learners; that is, internet connection, gadget, and technology. This paper aims to present the role of paradigm shift in facing the challenges of the 21st century teaching and learning. Specifically, it presents the existence of a digital divide in the classroom with the students as the digital natives and the teachers being the digital immigrants. It is made clear that a continuum set of characteristics is observed among the digital natives and the digital immigrants which educators should take advantage of in terms of choosing teaching strategies in the classroom. Data from the World Economic Forum and Knowledge Assessment Methodology validates the important role of digitization and paradigm shift in education in elevating the Philippine's Global Competitiveness Index, Knowledge Economy Index and Knowledge Index. Findings of this paper call the attention of Filipino educators to re-think the integration of technology in the teaching and learning process; thus, equipping students with 21st century skills. Further, as Filipino teachers and students endeavor in integrating technology in the classroom, they should learn digital citizenship, online etiquette, proper validation of information, and how to avoid cheating and plagiarism.

Keywords:
21st century teaching and learning
paradigm shift
information technology

Introduction

A quick view of the world wide web's growth from the 20th century to the 21st century shows sustained increase in the use of the internet. According to *Internet Live Stats*, approximately 40% of the world population has internet connection today in stark contrast to the less than 1% in 1995. The number of users or persons who have access to the internet at home via computer or mobile device increased tenfold from 1999 to 2013. It also reveals that the first billion users was reached in 2005, the second in 2010, and the third in 2014. As of July 1, 2016 approximately 46.1% of the 7, 432, 663, 275 world population are internet users. In the Philippines, approximately 43.5% of its population of 44,478,808 access the internet, constituting 1.3 % of world users. See Figure 1 in the next page.

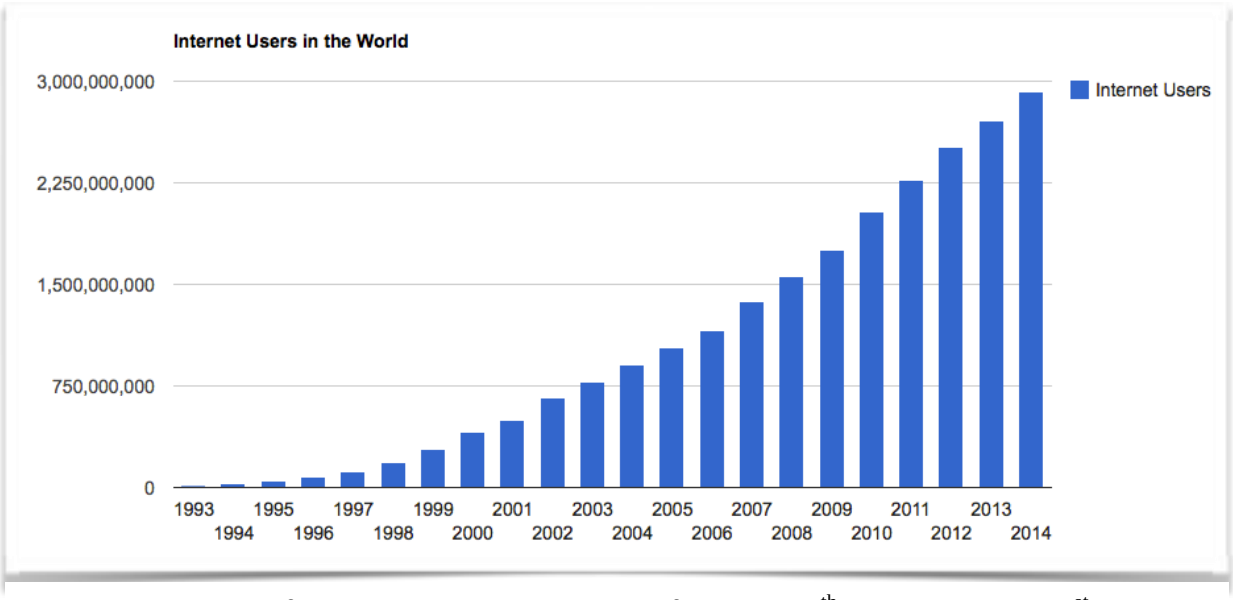

Figure 1. Growth of Internet Users in the World from the 20th Century to the 21st Century. *Source: Internet Live Stats*

Google, when first launched in September 1998 had processed only around ten thousand search queries per day (Batelle, 2005). Now, over 3.5 billion search queries are processed daily. Every second there are more or less: 7,000 Tweets sent, 700 Instagram photos uploaded, 1,000 Tumblr posts, 2,000 Skype calls, 128,000 YouTube videos viewed, and 2,000,000 Emails sent (Internet Live Stats**).**

Emerging technologies have undoubtedly and dramatically re-shaped our society into something diverse, fast, and open. With the rushing technological advancements, students nowadays are more digital and animated. Computers, electronic gadgets, and the internet, use of which have become progressively varied and complex and very much characterize the 21st century, have become part of their everyday life. But are our classrooms and teachers ready to cater to students of the 21st century? How many of these Google and other engine searches, tweets, posts or emails foster teaching and learning? Channeling the web to educational purposes has never been this absolute.

The fluid and fast exchange of information brought about by internet connectivity and technological advances add to the diversity of students inside our classroom. It is high time that we examine how students and teachers react to these technological advancements and how their teaching and learning style was affected. A clearer understanding of the continuum of characteristics among digital immigrants and digital natives may lead educators in deve-loping more relevant curriculum materials and engaging teaching strategies.

Whenever there is an inevitable change in the landscape of our society, those who are already comfortable with the previous ways of doing things may be resentful and resistant. However, such resistance may be overcome when stakeholders realise the value, use and benefit brought about by such change. This paper is an attempt to show the many possibilities and opportunities accompanying the paradigm shift in education using the Philippines international knowledge-related indexes and present the role of paradigm shift in facing the challenges of the 21st century teaching and learning. Being a new endeavour, this paper identifies a number of potholes in utilising information and communications technology in teaching and learning. Alongside, helpful patches were given to teachers who aspire to succeed in riding the wave of change.

Methodology

This paper offers a review of literature on the existence of *digital immigrants* and *digital natives* in the classroom. It also reviews the place of the Philippines in Global Competitiveness Index from 2009-2015, Knowledge Economy Index and Knowledge Index for years 1995, 2000, 2008, 2010 and 2012. An in-depth thematic analysis of literature covering topics on the existence of the digital immigrants and digital natives was conducted. The themes discussed in this paper like the *digital melting pot* by Stoerger (2009) and the concept of *digital wisdom* by Prensky (2009) emerged during the analysis. The identified themes were clustered and discussed accordingly. The literature used in the study are limited to those available online.

Results and Discussion

Who is Who

Marc Prensky (2001) uses generational standpoint to distinguish those who have technology skills and those without thus creating the digital native-digital immigrant dichotomy. According to him, digital natives grew up surrounded by digital technology and that the "digital world affords them many things that the previous world didn't". Having access to computers and the Internet had made them inherently skillful in the use of digital technologies (Oblinger and Oblinger, 2005, and Prensky, 2001). This group of individuals are alternately referred to as Net Generation, Millenials, Y Generation, etc.

Rapid technological advances having reshaped students' learning styles (Dede, 2005), the digital natives are said to be influenced in their preferences and skills related to their learning. They are believed to prefer receiving information quickly; be adept at processing information rapidly; prefer multi-tasking and have non-linear access to information; participate actively in learning; have low tolerance for lectures; and rely heavily on communication technologies to access information and to carry out social and professional interactions (Prensky, 2001).

Digital immigrants meanwhile are those born earlier than their counterparts and are considered foreigners in the realm of digitalization. The dichotomy therefore automatically designates the immigrants to the opposite side of the divide composed of older individuals lacking or lagging behind in knowledge and ability to navigate the digital world. However, Zur and Walker (2011), suggested that not all digital immigrants belong to the group of avoiders who prefer a lifestyle that is technology-free or with minimal technology. Many are reluctant adopters who realize that technology is part of today's world and try to use it with caution and a few belong to the group of enthusiastic adopters who believe in the value of technology and try their best to use it.

The gap created by the digital native-digital immigrant metaphor could compromise classroom learning when frustrated and disinterested digital native students have to deal with digital immigrant teachers who unknowingly or knowingly insist on using the teaching styles and preferences they are familiar and comfortable with. To add to that, Dean and Levine (2013) said that digital immigrant teachers tend to "replicate their preferred learning styles into their own teaching."

Technology has been with us for a quite a while and will be a mainstay in the landscape of modern society. We maybe late as it is but better late than be accused of preparing our students for their future using the very same tools of our past. As most of us are *digital immigrant* educators, we have to make ways to be proficient too in the use of technology to be able to communicate, create, and collaborate in the teaching-learning environment.

The Philippine Context

Data from the World Economic Forum (Schwab, 2010; Schwab, 2013; Schwab, 2014) reveal that Philippines has attained

the most improvement in Global Competitiveness Index. In a span of five years, our country has made great leaps from rank 87 (2009-2010), 65 (2012-2013), 59 (2013-2014), and 52 (2014-2015). However, although WEF recognizes the Philippines to be one of the best digitally connected developing countries in Asia, we still trail behind our neighbors in Southeast Asia, coming fifth only after Singapore, Malaysia, Thailand, and Indonesia. Greater upswings need to be done to raise us further in the list.

Figure 2 helps us identify areas for improvement to elevate the Global Competitiveness Index of the Philippines. For the year 2013-2014, WEF has classified the Philippines to be at a stage of development from a factor-driven economy to an efficiency-driven economy. Examining Figure 2, a number of determining pillars specifically Higher Education and Training (Pillar 5), Labor Market Efficiency (Pillar 7), and Technological Readiness (Pillar 9) should be in place to be in the efficiency-driven economy. As *digital immigrant* teachers cannot teach and give what they do not know and have, they certainly must increase their own digital literacy through learning and adopting technologies that they can easily use in the classroom. Along with sound Information and Technology curriculum and instruction, faculty, infrastructure, and other support systems, *digital immigrant* educators can help schools produce college and career-ready individuals adept at using technology and digital media. Commitment from stakeholders to make possible the adoption of information technology in instruction would help achieve Pillars 5, 7, and 9 and would positively impact on the standing of the Philippines in the world. This endeavor of paradigm shift targets skills and types of works that might not be known yet in our society (Coleman, 2014).

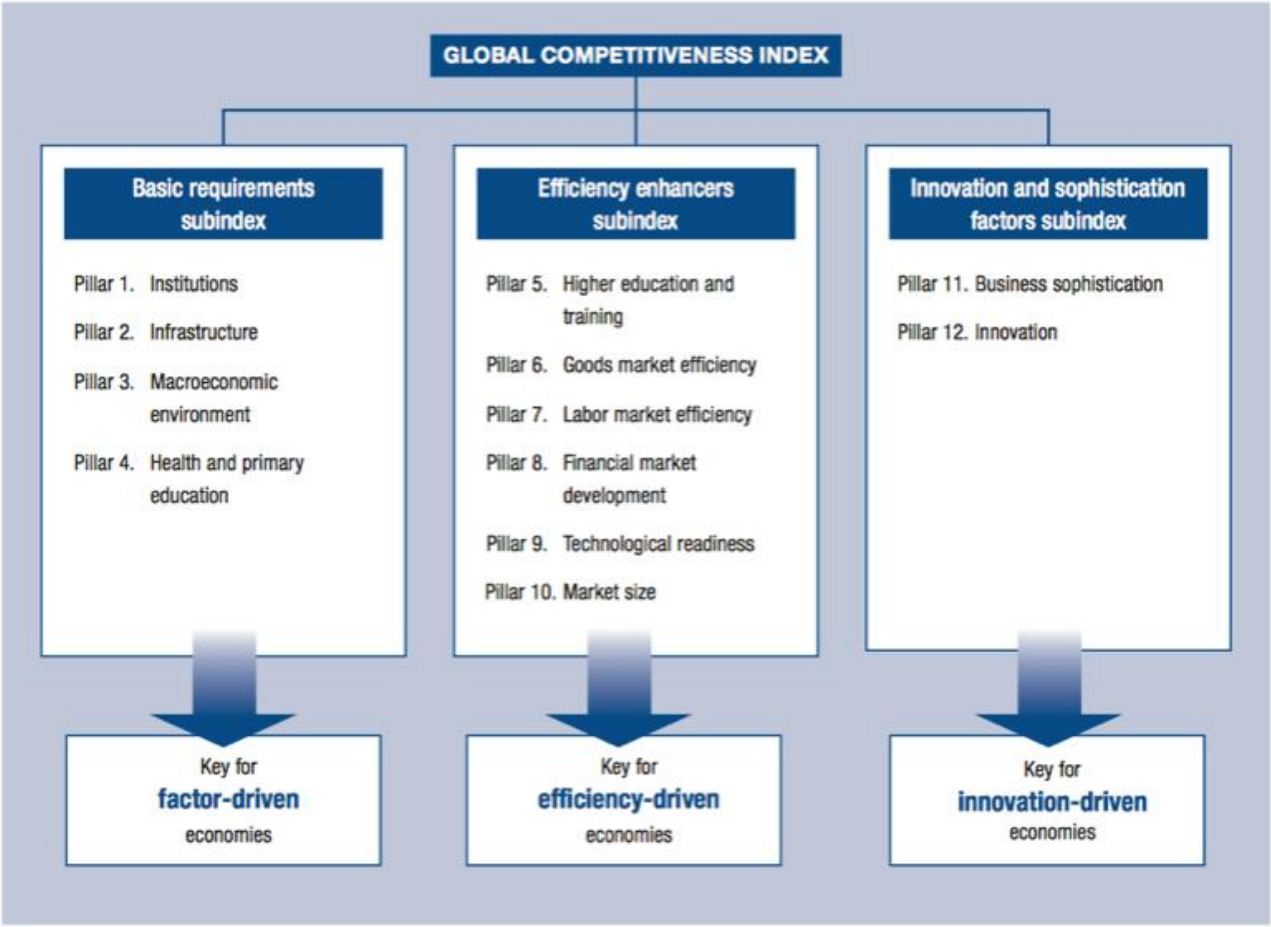

Figure 2. Global competitiveness index framework. *Source: Schwab, K. (2014)*

Other indexes to consider are the Knowledge Economy Index (KEI) and Knowledge Index (KI) of the Philippines. Information from World Bank's platform web.worldbank.org indicate how to utilize KEI and KI. Further, the Knowledge Assessment Methodology (KAM) which was devised by World Bank to determine challenges and opportunities facing a country in reaching the transition to the knowledge-based economy can be used to gauge our position with the rest of the countries.

KEI tells if an environment allows knowledge to be used effectively for economic development. It is computed by taking the average of four sub- indexes also known as the four pillars of the knowledge economy namely: a) economic incentive and institutional regime, b) innovation and technological adoption, c) education and training and d) information and ccommunications technologies infrastructure. On the other hand, KI measures the ability of a country to generate, adopt and diffuse knowledge. It is computed based on the three knowledge economy sub-indexes: a) innovation and technological adoption, b) education and training, and c) information and communications technologies infrastructure.

Table 1. Score card of the Philippines in knowledge economy index and knowledge index for 1995, 2000, 2008, 2010 and 2012 (0=lowest, 10=highest).

				Knowledge Economy Pillars			
Year	**KEI**	**KI**	**Rank**	Economic Incentive and Institutional Regime	Innovation and Technological Adoption	Education and Training	ICT Infrastructure
1995	5.07	5.24	65	4.57	4.09	6.25	5.38
2000	4.59	4.60	77	4.56	4.05	5.35	4.41
2008	4.25	4.02	79	4.95	3.63	4.76	3.66
2010	4.12	4.03	89	4.37	3.80	4.69	3.60
2012	3.94	3.81	92	4.32	3.77	4.64	3.03

Source: *Data collected from World Bank Institute's Knowledge for Development Program (K4D) Indexes (The World Bank, 2008; The World Bank, 2011; The World Bank, 2012).*

The Philippines has constantly dropped its ranking in both KEI and KI for the years shown in Table 1. The least drop was seen between 2000-2008 which is 0.25 steps/year, followed by the 1995-2000 drop rate of 1.4 steps/year. The rate of drop for the years 2010-2012 is 1.5 steps/year. A landslide fall-off was observed for the years 2008-2010 with 10 steps down in 2 years. World Bank, as a consequence, included the Philippines in the Top 10 countries with the most decrease in KEI rank between 2000 and 2012 (The World Bank, 2012), attributing the decrease mainly to the country's collapse in ICT infrastructure pillar.

Ordinario (2014), cited in his article *Invest in ICT, Innovation to Avoid Middle-income Trap, ADB Says,* the suggestion of Asian Development Bank to the Philippine government to venture more in Information and communication technology and in research and development to be in the knowledge economy. He also quoted ADB Vice-President for Knowledge Management and Sustainable Development Bindu N. Lohani as saying that "Knowledge economies use ICT, innovation and research, and higher education and specialized skills to create, disseminate, and apply knowledge for growth". As a case in point, Ordinario

reminded the educators of the alarming result of the 2012 Manpower Global Talent Mismatch survey which indicated that 45 percent of the participating employers in Asia had difficulty hiring for job positions due to lack of suitable talents in the market. Related to this, the Employers Confederation of the Philippines blames the lack of analytical skills of some graduates. To help our students fit in the workplace of the future, a re-think of our paradigms is therefore absolutely necessary.

Paradigm Shift: A Wave of Change

The statement of Albert Einstein "You do not get out of a problem by using the same consciousness that got you into it" applies to education reform. Educational problems of the 21st century just cannot be resolved using 20th century approaches**.** Policy makers just end up in a cycle of trial and replacement scheme in curriculum and instruction development.

Since use of computers, iPads, cellphones, tablets, internet, and other ICTs has become crucial to the day to day life of our students and seemingly cannot take their hands and heads off them, why don't we, *digital immigrant* teachers, plan lessons which would maximize the use of those technology? Eagles cannot be expect to swim in water! Some lessons in class are difficult because of the required competencies while some are made even more difficult because of the approach used by the teacher. Amazing outcomes could happen when we allow these active, animated and digital students the use of familiar and enabling means to learn. As Gallardo (2013) pointed out, students today can connect, communicate, collaborate and create better in a digitally empowered learning environment.

Shifts in paradigm constantly happen in education. Approaches and theories in teaching considered valid 10 to 20 years ago might not be applicable today. For example, Mike Gorman (2012) mentioned in his article Digital Immigrants & Natives Leaving No Future Behind Seven Steps To Educational Transformation how Bloom's Taxonomy was re-written by Lauren Resnick, Lorin Naderson and David Krathwohl to reflect its relevance to the 21st century. Revision in Bloom's Taxonomy included the use of action verbs instead of nouns to classify the levels of intellectual behavior and allowed students to start anywhere and move two ways in the hierarchies. This big leap in education reform highlights the active role of students in the teaching - learning process.

A study conducted by Marquez & Domantay (2006) shows that new information technologies in education and training foster student-centered approach and development of non-cognitive skills. They pointed out that "although the traditional chalk-and-board still has its merits, the new and more effective methods, such as multimedia sources, "Text2Teach" cell phone messaging, already being integrated into the classroom, are making an impact. The contemporary teacher must be familiar with the new educational technologies for delivering quality teaching."

While the digital native-digital immigrant dichotomy unwittingly implies that the latter can never become a native, hope is in the horizon as studies suggest that proficiency is more about exposure to technology than with a particular generation (Oblinger and Oblinger, 2005). Stoerger (2009), who reviewed related literature to establish the merit of her digital melting pot concept, said that results of studies such as those of Jones and Fox (2009), Lenhart, et al. (2008) would show that older adults spend more time online, countering the notion that technology skills are unique to the younger generation. Even Prensky (2009) eventually changed his view on the digital native-digital immigrant concept, forwarding instead the more accommodating digital wisdom which reconciles the needs and characteristics of the two generations.

The "one-size fits all" picture attributed to digital natives has also been challenged as studies reveal that not all those born to digi-

tal nativity are technologically savvy. Kennedy, *et al*., (2006), in studying 2096 students aged between 17 and 26 from three Australian universities found out that they possess a diverse range of technology skills and preferences, and belong to four distinct types of technology users: *power* users, ordinary users, irregular users, and basic users. Data from the study of Sanchez, et al., (2011) involving students from four cities in Chile revealed a generation without shared traits and a segment of learners demonstrating practices that do not characterize the entire generation.

Further, the review of literature by Stoerger (2009) also contained results of studies saying that students come to the classroom with different competencies (Oblinger, 2008); skill set of many of today's students is not matching the media reports (Bennett, *et al.* (2008); first-year college students lack basic understanding of some technical terms (Hargittai (2008); only a minority of students were into creating their own content and media for the Web, and "that a significant proportion of students had lower level skills than might be expected of digital natives" (Kvavik, *et al.* 2004). Studies in the same review also revealed that factors for the differences in technology skills include digital culture of a country (Lusoli and Miltgen, 2009); and socioeconomic status, age, and gender (Krause, 2007).

Given the above supporting evidence that older generation of teachers can learn and be skillful too in the use of technology and that students having different backgrounds, needs, and experiences do not have uniform technology set skills and savviness generally attributed to the digital natives, digital immigrant teachers should rise to the challenge to learn and use technology in the classroom, those that complement students' needs and even add on their existing skills. The conscious commitment and effort of the so-called digital-immigrant teachers to use educational technologies and to learn how to proficiently and effectively utilize them in making their so-called digital-native students learn and apply the 21st century knowledge and skills, will make the gap all the more less blurred.

To start speaking the *digital native's* language in class, teachers can use cellphones for student participation and polling. For more advanced applications that allow collaboration and sharing among students, the teachers can learn and use WordPress, Glogster, Prezi, Blogs, Wikis, Edmodo, Animoto, Audioboo, Voicethread, Voki and GoAnimate (Graham & Simmons, 2013). Use of the applications will enhance learning and help produce 21st century students with communication, collaboration, critical thinking, and information-handling and other skills expected of them. It is wise to bear in mind however to use information technology in moderation as digital native students expressed reservation in the use of too much technology in the classroom, and prefer to still use traditional approach in some areas related to their learning.

In the old paradigm, teacher imparts knowledge (Fogle, 2013). The teacher is at the center of the teaching-learning process. In the new paradigm, teachers can be the learners and even learners can be the teachers, the same way immigrants learn from the natives of a land. This shift in paradigm will require a lot of open-mindedness and so much more on our part. According to Clare (2013), the shift could start with understanding and acceptance that there really exist a divide between teachers and students in this digital world. This is supported by the result of the review made by Mumtaz (2000) on studies related to teachers' use of information and communications technologies which suggested that teachers' beliefs about teaching and learning with ICTs are central to integration. However, the result also showed other factors impinging on the teachers' decision to use ICTs suggesting that school and policy-makers should also come into the equation. A committed and sustained resolve to change to be able to adapt to the challenges of the 21st century

education therefore should be greater than the issue of student and teacher divide.

Prensky (2009) believed that digital immigrants while they can never become digital natives, can still acquire and possess digital wisdom, a newer concept he introduced, which he said can be achieved by using technology. Stoerger (2009), on the other hand, proposed the digital melting pot metaphor which she is certain will erase the negative implication of the digital native - digital immigrant divide that is still perpetuated in the digital wisdom perspective. The melting pot, according to her, is a "place where all individuals, including those who with low levels of competency, experience technology in a way that fosters opportunities without barriers." She emphasized the role of educators and their corresponding institutions in the digital melting pot assimilation process, "that of providing all individuals the chance to acquire, refine, and update technology skills".

Take Heed of the Potholes

Our burning passion for paradigm shift should not be dampened by some potholes. A literal pothole can be easily remedied by filling it with gravel or sand just before it gets bigger. In using technology in teaching and learning, there are some potholes to avoid. Just the same as a literal pothole, we fill it so it won't do any further damage to us and to our students.

A click can bring in all sorts of documents, books, articles, reviews in front of our students. Information highway has been widely open and accessible to all through the internet. However, not all information available in the net are reliable and valid. Students (and teachers) might pass by a pothole of just accepting without evaluating materials from the worldwide web (VanSlyke, 2003).

Bridget Dalton and Dana Grisham (2001) in their article Teaching Students to Evaluate Internet Information Critically enumerated some quick tests technology and education experts develop to evaluate the validity of materials from the internet. Teachers and students should consider the following before using or recommending websites in the internet: (1) Is it clear who has written the information? (2) Does the author use his/her real name? (3) Are you positive the information is true? (4) What can you do to prove the information is true? (5) Can the information be checked? (6) Are the aims of the site clear? (7) When was the site produced? (8) Is the information biased in any way?

Students might unknowingly copy information directly from the internet for their literature reviews or science reports. Cheating and plagiarism is one serious pothole students and teachers can avoid. Reportedly, the declining understanding of plagiarism is the root cause of increasing cases of cheating and plagiarism among students (Dean & Levine, 2013). Ann Holum and Jan Gahala (2001) – suggested that "to prevent students from presenting someone else's materials as their own, schools needs to develop firm policies on plagiarism and ensure that students, teachers, and parents are aware of these policies. Also, teachers can help students learn to summarize, rephrase, and acknowledge another person's ideas."

Another pothole to give attention to when using technology in class, even in a simple PowerPoint presentation, is that students might get distracted with the amusing features of a software and be carried away from their learning tasks (Holum & Gahala, 2001). Graphics, animations and music can fixate the attention of students. In this case, teachers should moderate some features of a technology depending on the requirements of the lesson. For instance, animation and graphics feature will definitely be needed in an Earth and Space Science lesson but not in a data analysis lesson in Research.

Technology makes almost everything easy specifically in exchange of information and in communication. However, Diane Dean & Arthur Levine (2013) warn students that "just because anything can be done with technology, doesn't mean one should." Students might overlook the need for proper digital and online etiquette whenever they use technology. To fill in this pothole,

teachers and students should make agreements on texting, receiving phone calls, using earphones and connecting to the internet during class. More to this, remind students to always follow online etiquette when engaged in online interactions. Also, teach students how to practice self-regulation in public online forums, what forms of expressions are appropriate to use and why it is wrong to use fictitious identity online (Holum & Gahala, 2001).

It is best to approach the use of information technology in teaching not only with moderation, but also with caution and with awareness that technology has its negative side. Preparing to mediate and counter the effects will ensure the delivery of good results which technology can offer in teaching and learning. For example, results from the study of Hennessy, et al. (2005), revealed use of ICT to enhance and extend existing practice; change as demonstrated by emerging activity complementing or modifying practice; and teachers developing and doing trials on new strategies particularly to mediate ICT-supported learning. Use of caution, critical approach, and influence of external constraints, according to the authors, mediated the potentially obstructive role of some forms of ICT by focusing more onto underlying learning objectives.

Similar to the sub-groups of the *digital immigrants* discussed previously, and as mentioned earlier also that students do not have equal exposure and attitude toward technology, Zur & Walker (2011) said that digital natives is also a highly diverse group. They assigned digital natives into three: avoiders, minimalists and enthusiastic participants. Only a small portion of the digital natives belong to the group of avoiders who seemingly has a distaste for digital technology. At the middle of the line is the minimalist group whose members are certain on the usefulness of technology in everyday life but they use it only when it is necessary. The bigger chunk of digital natives are the enthusiastic participants. From the name itself, enthusiastic participants use and savor technology day in and day out. What they like most about technology is the "fluid" communication and instant access to information. Knowing the proficiency level of students on use of technology will enable teachers to choose the appropriate technology and web applications in class which would ultimately translate to relevant and meaningful teaching and learning

Conclusion

The re-shaping of our society by technological advances has created digital divide among teachers and students. *Digital immigrants,* the individuals lagging behind in terms of technology, are also users and could be enthusiastic adopters of technology. *Digital natives,* the students who grew up surrounded with digital technology, also have different exposure and attitude towards technology. Thus, a *digital melting pot* in the classroom is necessary to provide open learning opportunities, "to acquire, refine, and update technology skills" of both the teacher and the learners. *Digital immigrant* teachers making use of technology to proficiently communicate, create, and collaborate in the teaching-learning environment will prevent possible frustrations and compromises in the classroom.

The Philippines has been struggling to place its name in the high ranks in terms of Global Competitiveness, Knowledge Economy Index and Knowledge Index. As one of the best digitally connected developing country as identified by the World Economic Forum, improving Philippine indexes would entail improving pillars related to higher education and training, labor market efficiency, technological readiness and information and communications technology. Definitely, paradigm shift is no longer a choice *but* a reality; and teachers have a big role to play. The reported mismatch in job positions and skills of graduates should propel educators to provide students with experiences that would prepare them for future skills and jobs. Applications of technology in education like WordPress, Glogster, Prezi, Blogs, Wikis, Edmodo, Animoto,

Audioboo, Voicethread, Voki and GoAnimate allow for collaboration and sharing among students and teachers. The application of technology in education is expected to enhance learning and help produce 21st century students with communication, collaboration, critical thinking, and information-handling skills.

Recommendations

As teachers, we should reflect on the instructional assumptions we make inside the classroom. In the light of the findings of this review, it is not safe to assume that our students prefer to learn using digital technology over the traditional lecture and that those who have access to digital technology know how to effectively use it. Personalizing learning should take into account the manner of instruction that appeals to our students. It is highly recommended to do baseline check of our students' degree of technology affinity, motivation in using technology and level of digital literacy before implementing technology based learning.

The much improvement needed in the performance of Filipino students, for instance in Math and Science, can be resolved with the help of technologically equipped teachers. The teachers, not the technology, improve the teaching and learning process; thus, the achievement of students. In using technology in the classroom, sufficient technical support should be given to the teachers to identify user friendly technology applications that meet the needs of the students and promote high student and teacher interaction.

More than using technology in producing an enabling environment for the *digital natives*, it is our utmost responsibility as teachers to make sure our students are safe and secured in this endeavor. We will be doing our students a great favor if we will teach them proper online behavior, information filtering and the likes. We can only do so by becoming more adept in digital technologies. It is recommended that teachers who are considering the use of technology in the classroom be familiar with available educational technologies. Identify possible problems and troubleshoot before actually implementing the technology in the classroom. Parents should also be notified and oriented on the planned integration of technology in the classroom: (1) What specific technology will be used? (2) How will it be used? (3) What are the rules the students are expected to follow? (4) Will the implementation of the use of technology in learning be against existing rules and guidelines at home?

Continuous monitoring of student activity and evaluation of such is part and parcel of the integration of technology in the classroom.

If we claim to be more experienced than the digital natives, then let's show them that no digital divide can hinder us from being their educator and friend. Let us channel our passion for teaching and learning and take advantage of the technological wave to prepare ourselves and our students of whatever the future holds.

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