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Article

Social, Technology, Economy, Environmental, and Political (STEEP) Landscapes in Philippine K to 12 Basic Education: Looking into the Lens and Perspective of Science Education

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Abstract

The paradigm shift in education aligns with achieving the 21st-century teaching and learning goals and enables educational institutions to respond to the call of the challenge. Ensuring every key aspect and element of successful curriculum implementation lies in the significant impact on which the curriculum should serve its purpose. This paper presents a critical review focused on the highlights in which social, technology, economic, environmental, and political (STEEP) landscapes impact Philippine K to 12 Science Education. It follows issues and approaches concerning science education in the country vis-à-vis theoretical and philosophical perspectives. This paper provides scenarios highlighting the possible contributions of the different landscapes that could serve as areas to maintain good practices and potential areas for improvement to achieve the mission and vision of the Department of Education. There are challenges that the whole educational system has faced since enacting the Basic Education Curriculum (BEC) in the country. The Department of Education (DepEd) continuously gives strategic directions to lead the education institutions to achieve 21st-century skills teaching and learning outcomes along with the other countries in the Southeast Asian region and the rest of Asia. All educational institutions and educational advocates should continuously work together to enable the educational system in the country to achieve inclusive growth and global competitiveness considering various landscapes that shape the educational landscape in the country.

Keywords
K to 12 Curriculum, Science Education, Education Landscapes in Philippine Education

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Introduction

Science education is one of the keys to success in today's global expectations. The Department of Education (DepEd) continues to uphold its mandate to have quality education for all Filipino children and keep the learners in the school so that no student is left behind. Every academic institution governed by policies and under the supervision of DepEd looks forward to learning outcomes of the 21st century. Curriculum implementers and classroom teachers deliver the learning competencies based upon the 21st-century skills that learners should imbibe. The reforms in Philippine education in the present time answer the needs and demands of the decade in improving the quality of education, quality of life, and quality of society. This drive of the educational system in the country directs teachers and students to behave towards a projected society in the future. Hence, there will be a noticeable change in the classrooms, students' learning interests, teaching approaches, learning materials and resources, and assessing and evaluating. Anthropologists like George Spindler, Margaret Mead, Herve Varenne, and Social Studies educators like Solon Kimball introduced Educational Anthropology (EA) in the United States in the 1950s. The first EA conference happened when the US court ruled that racial segregation in schools would be forever prohibited. The lingering effects of the civil rights movement, the coming of migrants from all around the globe, and the movement on the liberation of women were part of the social context which influenced the growth of AE (De Marrais, Armstrong, & Preissle, 2011).

Our teachers have to learn how to be the 21st-century facilitators of learning. In other words, for schools to sustain the delivery of education, teachers should look into the demands and future of society. The teachers have to base their style on the learning styles of students. The main goal of teachers is to ensure that they have transpired and transcended the expected learning outcomes among the students so that they will become adept for the next decade. The learning experiences, inside and outside of the classrooms, inform the future careers. In the Philippine educational landscape, K to 12 education optimizes the efficiency and competency of Filipino graduates (Ellar, 2015).

Since the teachers are the drivers of an educational system and direct implementers of the curriculum in the classroom, they direct and guide the students; they also play a pivotal role in establishing their interest in learning the subject. As direct implementers of the curriculum in the classroom, they engage students in different learning experiences to develop their understanding. Teachers have to deal with the needs and issues of the students and demands of time if they reflect on their daily teaching-learning activities. Teachers find ways to prepare appropriate pedagogical approaches suitable to students' diverse needs and motivation for learning; teachers should reflect on this.

However, several factors affect or hinder the education of Filipinos, thus, preventing them from continuing or completing basic education. We cannot deny that our learners experience hardships, difficulties, and challenges in pursuing their education. In other words, there are aspects or elements in our educational system that affect the success of the delivery of instruction and the achievement of the mission and vision in Philippine education. These elements are either opportunities or barriers to education in the country. These also dictate the next generation of professionals, skilled workers, leaders, and citizens.

In this paper, ideas are presented and looked into the importance of social, technological, economic, environmental, and political landscapes to support the educational system. These are the guiding principles and core areas of the Philippine Basic Education Curriculum in Science. In addition, they address the issues and concerns associated and related to Science education. Moreover, this paper provides scenarios highlighting the possible contributions of the different landscapes. They are necessary to maintain good practices or improvements in science education to support the Department of Education's vision and mission.

Social Landscape in Philippine Basic Education

Students nowadays try to expand their social community and become more open and share their stories. Communication is easy for them. This behavior of students is an opportunity for teachers to engage them in discussions. The teachers can guide them to learn how to exchange ideas and insights. Teachers should be innovative in trying to encapsulate their interests and social attributes. In addition, they should be open-minded and try to know well how students interact with each other. Through this, it would be easy for the teachers to understand the context of the Gen Z learners and know their views of learning, thinking, and communication styles. Tindowen (2007) stressed the importance of classmates as a support group who could help the learner freely share ideas. The opportunity to collaborate and communicate among students is the focus of 21st-century learning. Strategies change based on the behavior of the students. Change in society also means a change in the manner that a teacher should teach. Teachers should present approaches to help students learn how to think and practice what they learned, find ways to engage them in healthful discussions, and open up their sentiments regarding societal issues. Teachers should show a willingness to listen and allow students to engage, participate, think, and contribute to school improvement, the success of the curriculum, and the whole educational system.

Another aspect of the social landscape in education is the engagement of parents in the school. Parents must have strong participation and involvement in school-related activities. These activities would include attending a general meeting, meeting with class advisers and subject teachers, attending school events, volunteering, and serving a committee. Others are writing communications for the school, tutoring, providing educational enrichment to support the educational activities, and bringing the child to school on time. Most commonly, the school has the active Parents-Teachers Association (PTA) on which teachers and parents implement programs for students. Research findings recognize the significance of home and school partnerships. Such partnerships contribute to student achievement reduce drop-outs. In addition, home–school partnership impacts the child's academic performance (Studsrod & Bru, 2009).

The involvement of parents in the education of their children makes a significant difference in their school achievement (Makgopa & Mokhele, 2013). When parents are involved, it can promote better cooperation between parents and the school, thereby enhancing the academic progress of a child (Olatoye and Ogunkola, 2008). Students with parents involved in their schooling tend to have fewer behavioral problems, perform better academically, and are likely to complete high school than those students whose parents do not involve themselves in their children's education (Henderson et al., 1994). Baker and Scher (2002) argued that parents have a critical role in their children's academic performance. Involvement allows parents to monitor school and classroom activities, coordinate their efforts with teachers to encourage acceptable classroom behavior, and ensure that the child completes schoolwork

(Hill et al., 2004). The parents' engagement in schools influences achievement, nurtures intelligence (Schiffrin et al., 2015), and decreases drop-out rates (Park & Holloway, 2013). The parents, therefore, should be encouraged to involve more in their children's academics to achieve better performance. In addition, active parents provide more insights into the home and community lives of children. As a result, they are confident that their children are supported and well served (Robinson, 2017). Parental engagement can facilitate access for school leaders to engage parent collaborations which support and assist school leaders and school personnel in looking after the children (Epstein, 2001). A strong link between the parents and school would lead to the following outcomes: (1) solving the problems of the educational institute, which is the second home of students, with the help of parents; and (2) reducing the number of school drop-outs (Iran Daily, 2015). Hence, the school should allow parental involvement to support decision-making at the school. In addition, it contributes to the academic success of students (White & Kelly, 2010).

Technological Landscape in Philippine Basic Education

There is a significant change in the use of technology in school. Since the curriculum anchors on the expected 21st-century teaching and learning, particularly in utilization and technology in education, science teachers should be updated with the technology trend in education in science teaching. Nowadays, learners are 'digital learners. As a science teacher, I impart technology as part of my learning resources to aid the strategy I want to deliver the curriculum, including discovering science concepts. As Ryan and Cowie (2009) claimed, technology can foster independent and collaborative learning, while Osborne and Hennessy (2003) asserted that ICT integration could enhance investigative learning in science. Technology is essential in teaching and learning science; it makes science fun and enhances students' learning. Therefore, educators had to integrate digital skills to prepare their students to work in a highly digital workspace (James, 2019). She also added that technology in the classroom needs guidance and knowledge on proper utilization to impact student development truly. However, the problem is that computer laboratories for hands-on simulations are not available. In addition, many students have no access to an internet connection. They cannot afford to have internet connections at home. They rely on rentals in computer shops. In worst cases, they cannot afford to pay for any form of internet access due to financial reasons. Another problem is a lack of technology, technical support, and teachers' inability to use technology (Limjap et al., 2017). As a result, students fail to appreciate the extent of its application in their education even though they see technology as an essential factor in their learning (Limjap et al., 2017).

Teachers have no choice but to integrate technology in their classrooms to facilitate their practice to improve and maximize students' learning. Teachers can positively influence the phenomenon of learning through appropriate means of teaching. It is because technology can support the learners' capacity to engage in lifelong learning (through self-directed and collaborative inquiry) and connectedness (through communication and collaboration with peers and experts (Law & Yuen, 2006).

There are still factors to consider in using technology in the classroom. First is the availability of those elements of technology in the school. There are computers in school. Nevertheless, those are not enough to cater to all students for individual hands-on learning with or without internet connectivity. This scenario limits the delivery of instruction. It is now in the hands of science teachers to find alternative ways and strategies to deliver science concepts

that would expose students to the importance of technology in promoting literacy and numeracy. Second is the availability of a computer and internet connection at home. In the public school system, the majority of the students do not have these things at home. They need to spend hours renting spaces in the computer shop to work on their school requirements; this limits the chance for every learner to explore and retrieve information online. These concerns pose a challenge to schools, especially in situations where teaching and learning must continue despite the limited resources. In this light, the school needs to find ways to cater to every learner using technology.

However, the teachers should be first motivated and encouraged (especially the seasoned teachers) to use the technology in their classes. Such motivation could be possible if they have enough technical skills and can use technology in their lessons. In one of her statements on technology integration in the classroom, Clarissa Segismundo, the Education Programs Lead at Microsoft Philippines, explained the importance of digital tools in learning. She said that "engaging students remains one of the core pillars in the digital transformation of education. How they use technology is crucial in promoting collaboration, critical thinking, and problem-solving skills". Digital information has indeed made a relevant impact on the lives of our students. Moreover, the projection of the demand of industries for digitally skilled graduates is also increasing. Hence, governments, schools, and groups invested in education recognize and acknowledge the impact of technology and have invested hugely in technological resources hoping that it will facilitate and improve teaching and learning.

Economic Landscape in Philippine Basic Education

The economy reflects the kind of education that we have in the country. Education increases the innovative capacity of the people and facilitates the development and adaptation of new ideas (Yap, 2012). A more robust economy means a lot for education, particularly in the school setting. A basic example is having sufficient funds for the operations and maintenance expenses of schools. The school will also be capable of providing the needs of the teachers and the students, such as learning materials, conducive classrooms, and facilities/equipment. The ability of the school to provide the essentials to teachers reflects the quality of education that every school can provide.

Aside from what the government can provide, external stakeholders such as non-governmental or private companies could also sponsor school activities and programs as part of their plans in helping the schools. The cycle continues since the companies need qualified graduates to work for them and enough workforces depending on what kind of job that these companies can offer. The greater the students' initiative and skills development, the greater the advantage they will utilize in their careers to come (Pack, 2016). As long as there is a proper use of funds and a partnership between the school and the companies, the school can ensure that all students will have enough support to avoid drop-outs and other problems.

When schools are better and have an adequate budget, the investment in education manifests in the quality of human capital (Gylfason & Zoega, 2003). Education increases the skills and experience of teachers and students, thereby increasing productivity and, ultimately, output. Education is vital in a rapidly evolving economic environment where rapid job destruction and creation might otherwise lead to a gap between the skills demanded in the labor market and the skills of job-seekers (Yap, 2012). Based on the study conducted by Switzerland-based business school International Institute for Management Development (IMD), the Philippines witnessed a deterioration of

its ability to provide the economy with the skills needed. Such deficiency has caused the mismatch between school curricula and the demands of companies. The report suggests that the country participates consistently in international learning assessments to make Filipino learners and graduates globally competitive. The country's participation in global learning assessment would improve the educational system leading to a more improved economy.

Education has been one of the critical determinants of economic growth (Gylfason & Zoega, 2003). However, the primary reason that hinders students from coming to school is economic-related issues. Students experience financial constraints in their schooling, particularly in buying things for school or family income, which is insufficient to support their projects and other essential materials and activities that need money. Financial reasons were a significant cause for school leaving among secondary school drop-outs (Nava, 2009). On the other hand, students with better education have career navigation knowledge and skills, are likely to expand learning, have better career opportunities, and make the right decisions (Zikica & Klehe, 2006; Hirschi, 2011). With a higher-quality higher education system, the Philippines can reap the well-documented economic benefits of an educated population (Yap, 2012).

Environmental Landscape in Philippine Basic Education

The Science teachers' task is to implement the science curriculum to guide the students in achieving necessary skills of the 21st century as well as to obtain the target goals of the DepEd by engaging the students in discussions of relevant issues that involve science, technology, and environment. Aside from other landscapes presented in this paper, the environmental landscape could also affect K to 12 Basic Education. The school environment is one of the most important factors affecting students' learning. It is the right of every learner to have a healthy and safe learning environment. As a developing country, the Philippine education system has been considering critical elements of successful delivery of services such as the curriculum, learning resources and materials, competency of teachers, utilization of technology in classroom instruction, strengthening the support of stakeholders and industries, and improvement of school facilities. Education leaders find ways to align students' thinking by making the school learning environment available to think critically, uplift their learning capacity and increase students' achievement while increasing collaboration and interacting with their classmates. With the support of policymakers and business people, the country's education system is gearing towards ensuring that students will achieve 21st-century skills such as teamwork, collaboration, effective communication, and critical & creative skills. However, there are difficulties that schools are facing relative to their learning environment. The quality of the learning environment is significant to pupils' everyday learning. If schools do not have facilities, teachers, and other learning resources, the teaching of pupils might be adversely affected (Cardenas & Cerrado, 2016).

Altmann (2015) discusses how school and classroom space learning environments influence education. He mentioned that school and classroom designs, including physical arrangements, space, and classroom size, contribute to the students' learning outcomes. For example, overcrowded classroom conditions make it difficult for students to concentrate on their lessons and limit teachers' time on innovative teaching methods such as cooperative learning and group work or teaching anything beyond the bare minimum required by the curriculum (Jones, 2017). Aside from the crowded classrooms, Joshi, Pandit, & Kuma (2005) mentioned in this study various poor environmental conditions, which include inadequate ventilation,

shortage of clean drinking water, unclean or untidy clothing worn by pupils, poor nutrition, lack of greenery in the school area, air pollution and lack of environmental awareness among teachers.

In environmental awareness, evidence suggests that teachers possess narrow mental models of the environment (Mosely, Desjean-Perrotta, & Utley, 2010) and lack a background in environmental issues (Forbes & Zint, 2011). Another problem is that the lack of environmental knowledge, awareness, and behavior among the students. Science teachers can help students develop their understanding and responsive behavior towards their environment (Rahman et al., 2018).

The Department of Education is looking into effective programs to realize its mandate and goal to deliver quality, accessible, and relevant education for all Filipino learners. The Department of Education (DepEd) and the United Nations Children's Fund (UNICEF) jointly strengthen the WASH in Schools program, promoting hygiene among students and contributing to the Social Development Goals global agenda. In 2016, the DepEd issued Order #10 to present the policy and guidelines for the comprehensive water, sanitation, and hygiene in schools (WinS) program for the promotion of correct hygiene and sanitation practices among learners in all learning institutions as well as in the maintaining a safe and healthy school learning environment. The critical components of the WinS Program are the availability of safe drinking water, adequate water for cleaning, and functional toilets. Another component is the supervised daily group hand-washing with soap and brushing of teeth with fluoride toothpaste among learners, environmental sanitation, semi-annual de-worming of schoolchildren, safe practices in food handling and preparation, effective menstrual hygiene management, health education for all students and personnel, and capacity building for all DepEd program implementers (Malipot, 2017).

Another essential factor that every science educator can do for the students provides a meaningful yet positive learning experience. Teachers can create a positive learning environment where students are motivated to learn within the boundaries of a safe learning atmosphere. Teachers believe that their strong commitment will help overcome these constraints and challenges (Rahman et al., 2018). A positive learning atmosphere is where teachers and students interact and share their thoughts. Students feel comfortable sharing their ideas because the teachers show their care to the students. An effective learning environment helps students to realize their limitations and turn them into learning. In this learning environment, teachers should provide constructive feedback and not be harmful to their students.

Another issue to address is the weather disturbances or hydrometeorological hazards that lead to dropping out of some students. For example, flooding in residential or disaster-prone areas due to heavy rainfall contributes to missing schooling. In addition, geological hazards like landslides or mudslides can compromise the students' safety in going to school. Thus, another factor that affects the drop-out rate is disasters (Amoroso & Bajo, 2014).

Some countries, however, struggle with the issue of increasing school drop-out rates, which is fast becoming a severe social problem (SEAMEO INNOTECH, 2017). The school learning environment also serves as an excellent place to simulate social issues related to science concepts such as global warming, mining, types of pollution, disaster readiness and risk reduction, and the like, for example, the integration of practical applications of the science lessons in the issues of the environment. Science teachers can

help students engage in educative experiences and sustain their learning experiences inside and outside the school (Abrea, 2015). Aside from participating in different activities related to environmental education, science teachers can use technological applications to engage students in advocating environmental education online. They can share infographics, video presentations, and blog posts related to environmental protection and conservation. The students are digital natives; hence, they should perform tasks that enhance their technical and social skills. If ICT can promote the effectiveness of environmental education, educators should carefully consider it. The effective use of ICT supplementary to the direct experience method would enhance the environmental education curriculum (Caivazidis, Lazaridou, & Hellden, 2007). The collaboration of stakeholders is essential in the processes involved in sustaining the environmental education programs.

As an educational and social institution, the school is the right avenue to develop students' skills, knowledge, and values to become competent, creative, and responsible participants in the learning environment. The indicators for successful participation would be what students know academically, want, and perform independently or with others. Authentic student participation in school processes is also an essential element of personally meaningful learning (Simovska, 2004). Participation presupposes improving students' self-awareness, decision-making, and collaboration skills, connecting students and the school, and empowering students and school communities. It also allows learners to make informed decisions and responsible actions for environmental integrity, economic viability, and just society for present and future generations. Other bodies such as the Department of Science and Technology – Science Education Institute (DOST-SEI), Department of Environment and Natural Resources – Environmental Management Bureau (DENR-EMB), Non-Government Organizations (NGOs), Junior Environment Advocacy Program (JEAP) of the Local Government Units (LGUs), and Youth for the Environment in School Organizations (YES-O) have involved themselves in implementing relevant projects and programs towards ensuring school environment safe for all students. A comprehensive plan supported by laws and policies from our lawmakers and authorities from the Department of Education with the support of industry sectors can help to improve the 21st-century school learning environment for the students.

Political Landscape in Philippine Basic Education

Since the government's policy bounds the school, it is also inevitable to change governance. The political landscape is changing the country's educational landscape because of the government's drive to uplift the students' learning achievement. Different political platforms mean different directions and targets because politicians have other areas of focus. These people are policymakers, and whatever policy is approved and implemented would be the legal aspects that the school has to follow. Implementing these policies will bring significant reforms in every teacher's life and students' life. The politicians give their support to the president on his plans for the common good of the people. However, there are still criticisms about his leadership and management styles. For example, in terms of salary increase, the teachers are asking for it because the present salary grade is not enough to sustain the needs of the families. The implementation of the train law triggers price hikes in essential commodities and has brought a chain effect in the lives of our teachers. Politicians drafted their versions of salary increase for teachers, but it is still in the president's hands if he will push through with it or not.

On the other hand, the lives of students are also affected. They have to deal with the laws and policies implemented in their community. The challenges and problems that they face in the community will also affect their outlook in the school. Politics in education is an issue that presently pervades the educational system in the country (Durban & Catalan, 2012). They shared that the formulation of policies' primary intent is to make the educational system at par with other countries even though there are no concrete guidelines on implementing these policies. As a common practice, school heads seek financial support from politicians to sustain various school projects.

The local government units must extend assistance to schools because they are external stakeholders represented by these politicians. They can help ensure success in delivering educational services. However, it will be a concern for everybody if such assistance will lead to asking favors from school officials. This paper argues that there should be a strong partnership with the school and its external stakeholders, for example, the local government units. However, processing important documents is a concern before releasing the budget to ensure transparency and accountability in government operations. Both transparency and accountability serve as cleansing mechanisms to check and pressure the bureaucracy to respond to public demands with ease and quality (Gabriel, 2018). Politicians can contribute to the change of the educational landscape in the country to make this country a better place for the students, starting from improving the educational system, who are the primary beneficiaries of the educational process because they support policies. The teachers' welfare is an essential factor in educating the future leaders of this nation. Hence, it is necessary to consider laws that uphold teachers' competency and provide sufficient learning materials and compensation. The quality of our teachers reflects on the quality of education that every learner deserves. The competence of the teachers in the standards associates or influences their teaching performance (Roberto & Madrigal, 2019).

STEEP Landscape in Research and Development of Science Teaching

In the Philippines, science education is a top priority shown in one of the strands of the K to12 curriculum. It is a recognition of the vital role that science plays in the countries' success. Science provides worldwide opportunity through innovations and research and development. Various promising studies contribute to the improvement and development of science teaching practices. DepEd provides research capacity building to science teachers based on the research agenda such as curriculum development, teaching and learning delivery, gender and development, and governance. Seemingly, the STEEP landscapes guide every teacher in conducting their research. The results of which will inform educational policies and determine the direction of education in the country. Every teacher should then acquire, understand, and see the opportunities of conducting classroom-based action researches. These are essential tools to improve students' learning and make science fun and interactive. Examples of these researches are strategies to enhance student achievement, innovative and interactive instructional delivery and assessments, and interventions to scaffold and help improve performance and achieve the expected learning outcomes. Action researches could also provide a basis for policy decisions and the implementation of programs and activities. Science teachers are encouraged to conduct studies to equip students with knowledge, skills, values, and attitudes for the 21st century. In addition, these studies empower them to be leaders in a complex and competitive environment.

Conclusion and Implications

Science teachers believe that science education has to be continuously improved to respond to society's needs. It is mainly because science teachers contribute to nation-building that educates and inspires scientifically, technologically, environmentally literate students. In the school context, science teachers should ensure that students will be more prepared to align their skills and abilities according to society's needs. However, they are more challenged when it comes to effectively imploring the teaching-learning process inside their classrooms, especially the demands of the 21st century.

Moreover, science teachers should consistently deliver the curriculum prescribed by DepEd and plan for an appropriate strategy by all means while reflecting on the limitations as opportunities for improvement. All educational institutions and advocates should continuously work together to make the educational system in the country achieve inclusive growth and global competitiveness. There should be equal learning opportunities for all learners. Furthermore, DepEd should also intensity effective collaboration and partnerships among schools' stakeholders. Everyone hopes that the actions of educational leaders would strengthen the aim of schooling towards moving forward and improve the quality of life of every Filipino in the country, considering the relevance of various landscapes that affect the country's educational landscape.

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