

Filipino Teachers' Reflections on Critical Pedagogy (CP) in Science Education

Louie B. Dasas

lbdasas@ust.edu.ph

University of Santo Tomas, Manila, Philippines

Abstract This study examined the Filipino teachers' reflections on critical pedagogy (CP) in Science education. More specifically, it described a) how Science teachers/coordinators perceive CP, b) the degree to which Science teachers perceive to use CP in the classroom, and c) the applicability of CP elements in Science classrooms. This descriptive research made use of in-depth interviews and the CP survey questionnaire (CPSQ). Purposive sampling was used to select participants (n=11) from three different schools in Metro Manila. In-depth interviews were analyzed thematically, while CPSQ data was analyzed using descriptive statistics. Findings revealed that participants displayed a functional understanding of CP in terms of aims, goals, and dynamics of use. Beginning teachers remain ideal as per the degree of using CP in the classroom compared to experienced teachers. The study suggests that some CP elements could be well applied in Science education in terms of content and methodology.

Keywords: critical pedagogy; Filipino teachers; Science education; science pedagogy;

Introduction

The uncertainties of the 21st century require a transformative kind of education. Critical pedagogy (CP) is a transformation-based approach to education which democratizes teaching and learning making students achieve critical consciousness (Abraham, 2014). The known CP proponents include Freire, Kincheloe, McLaren, and Giroux (Aliakbari & Faraji, 2011). However, CP, as applied to education in the Philippines, especially in Science education, remains underexplored. Modern CP advocates argue the need for critical theory to migrate from ideology to meaningful classroom practice (Breuing, 2011). Thiet (2017) claims that CP can be applied to Science classrooms. In the Philippines, however, Science teachers rarely use inquiry and problem-centered teaching (Macugay & Bernardo, 2013), which are both essential elements of CP. Hence, there is a need to study CP in the realms of Science education in the Philippines. This study investigates Filipino teachers' reflections on CP, particularly in teaching Science, and provides insights into "Filipinized" CP and its applicability in the classroom.

Early Roots of CP

The core idea of CP is built on previous notions, ideas, and theories. CP finds its roots in influential critical theorists like Hegel, Kant, Marx, and Engel, who put forward people's valuable contributions to society (McKernan, 2013). Derivative ideas of Giroux, Simon, Apple, and McLaren asserted how schools are agents of transmitting political, social, and economic life messages within the bounds of CP, and underscores teachers' roles (Ross, 2018). Freire, regarded as the 'inaugural philosopher of CP' (Abraham, 2014), is well-known for his work *Pedagogy of the Oppressed*. Freire described a problem-posing education model that values student experience and the dialogical method of teaching and learning. Movements such as critical social theorists and

post-structuralism arise from the historical roots of CP (Cho, 2016). Present-day CP includes discourse about CP theory and CP praxis such as power and hegemony in knowledge production (Kincheloe, 2012) and alternative classroom practices responding to societal changes (McLaren, 2019).

CP as applied to Education

The applicability of CP in education varies greatly. CP as applied to education focuses on “ what students know based on their daily lives” (Katz, 2014, p. 2). Teachers use real-life experiences to engage students in discourse (Sarroub & Quadros, 2015) and foster critical thinking. Common disciplines using CP are Social Studies (Datoo & Chagani, 2011; Garrett & Kerr, 2016) and Language Arts (Crookes, 2012). CP roots (theoretical and philosophical) are also used in CP to tourism education. CP integrated in tourism curriculum posits favorable effects on individual freedom social justice and business productivity (Belhassen & Caton, 2011). Intrinsically, any classroom can become a loose avenue for the enactment of CP. However, there exists a lack of definitional precision of CP, thereby hampering successful CP in the classroom (Thomson-Bunn, 2014).

Table 1.
Selected definitions of CP.

Author	Definition of CP
Simon (1987)	“the goal of educating students is to take risks, to struggle with ongoing relations of power, to critically appropriate forms of knowledge that exist outside of their immediate experience, and to envisage versions of a world which is ‘not yet’” (p.375).
Shor (1992)	“... habits of thought, reading, writing, and speaking which go beneath surface meaning, first impressions, dominant myths, official pronouncements, traditional clichés, received wisdom, and mere opinions, to understand the deep meaning, root causes, social context, ideology, and personal consequences of any action, event, object, process, organization, experience, text, subject matter, policy, mass media, or discourse” (p.129).

McLaren (1998)	"...is a way of thinking about, negotiating, and transforming the relationship among classroom teaching, the production of knowledge, the institutional structure of the school, and the social and material relations of the wider community, society, and nation-state" (p.45).
Burbules and Berk (1999)	"is an effort to work within educational institutions and other media to raise questions about inequalities of power, about the false myths of opportunity and merit for many students, and about the way belief systems become internalized to the point where individuals and groups abandon the very aspiration to question or change their lot in life" (p.51).
McKernan (2013)	"... is a movement involving relationships of teaching and learning so that students gain a critical self-consciousness and social awareness and take appropriate action against oppressive forces" (p. 425).

Table 1 enumerates selected CP definitions. Simon (1987) cites the importance of risk-taking and power-struggle, sharing commonality with Burbules and Berk's (1999) definition. Shor (1992) and McLaren (1998) underscore CP as a way-of-thinking or 'habit-of-thought'. McLaren also identifies a four-pronged CP milieu: classroom-teaching, knowledge-production, school-structure, and wider-community. Alternatively, McKernan (2013) argues how micro-level teaching and learning impact the macro-level society by developing students' self-consciousness and social-awareness. Despite varying CP definitions, three common elements emerge: 1) looking at one's culture and lived experiences; 2) reflecting critically on the world and society and various factors that create oppression, and 3) transformation defined by action causing change to society, which ultimately reshapes one's views and thinking.

CP in the Philippine Context

CP in the Philippine context is grounded on a long history of liberatory praxis and, more recently, fueled by Filipino global diaspora (Viola, 2012). Freire argues the concept of internal decolonization and posits the importance of remembering what it is to be human. Education is a way to

transform oppressive structures and liberate ourselves from internal colonization. These ideas appeal to Filipinos, given their long history of oppression and domination of colonizers. Freire's ideas inspired educational reforms on free access to education such as public schools and Universal Access to Quality Tertiary Education Act (Schugurensky in Cortez, 2013). However, Cortez (2013) underscores that attempts to bring CP in the Philippine classroom-context remain scarce.

Despite a traditional Filipino society, CP, as applied to Philippine education, remains promising. Even today, Philippine education presents a traditional inclination where teaching is knowledge-transmission, and learning is knowledge-retention (Fulgencio, Sedilla, & David, 2014). Pedagogy and evaluation of learning remain traditional and teacher-centric – what Freire calls banking model of education. The emerging call for “filipinization” of CP (Cortez, 2013; Marquez, 2017; Viola, 2014) and applications of CP in education (Cortez, 2016; Moratilla, 2019) speak of the relevance of using Philippine context to liberate not only learners but more so educators. CP in the Philippine context allows students to realize a pathway towards emancipation amidst oppressive social conditions (Marquez, 2017). A “filipinized” CP must be deeply grounded on unique Filipino experiences and contexts. Thus, conscious effort is needed to reflect on what CP means for the Filipinos and how it translates into actual education practice.

The literature on using CP in the Philippine classroom remains limited to critical literacy (Fajardo, 2016) and language (Parba, 2018). Fajardo (2016) examined teachers' understanding of CP using the context of teaching critical literacy and emphasized lack (and the need) of a clear understanding of CP in Philippine education theory and praxis. Parba (2018) scrutinized integration of CP in a Filipino language classroom and posited the importance of critical dialogue between teachers and students leading to

curriculum-negotiation space. Both studies reasoned that using CP must be cognizant of teachers' CP perspectives, as teachers play critical roles in reshaping the curricula and advancing CP use (Marquez, 2017). Therefore, it is fitting to investigate how teachers operationalize CP in the context of Filipino experience and how classroom realities pose relevance. There is much to know about conceptualizing CP in the context of other subjects such as Mathematics and Science (Cortez, 2013).

Science Education in the Philippines

Science education in the Philippines faces confounding challenges that directly affect how students retain concepts, analyze, and solve problems. The recent PISA results reveal that Filipino students scored lower than the OECD average Science (OECD, 2019). The results of the 2018 NAT mirror the same dismal performance with decreased mean percentage scores. Despite the efforts to improve Science education, perennial problems continue to prevail. These include a shortage of qualified Science teachers, incongruent teaching assignments with teachers' educational background, and lack of quality textbooks and equipment (SEI-DOST & UP NISMED, 2011). Science education in the Philippines remains dominantly teacher-centered. Instruction primarily involves knowledge-transmission and does not involve inquiry-oriented activities nor encouragement of self-directed and effortful learning (Macugay & Bernardo, 2013). A banking model approach to teaching and learning Science affects how students *learn* and *do Science*. CP applied in Science education involves a student-led inquiry process (Rodriguez, 2014) that allows them to reflect on concepts and experiences, moving from merely knowing to actually doing. Hence, it is fitting to explore how CP can be applied to Science education in the Philippines.

CP in the Philippine context considers unique Filipino experiences and contexts (Cortez, 2013; Marquez, 2017; Viola, 2014). Despite the call for a “filipinized” CP, a clear definition of CP in the Philippines remains unapparent. This study explores Filipino teachers’ CP definition and their perceived classroom use, extending the discourse towards emerging a definitional precision of a “filipinized” CP. Given the teacher-centric nature of teaching Science in the Philippines (Macugay & Bernardo, 2013), this study explores CP elements applicable in learning and doing Science in the classroom. CP in Science education is characterized by authentic relationships (Rodriguez, 2014), where student-led processes are based on Filipino experiences and contexts. The study’s framework (Figure 1) outlines how the objectives of the study are sourced.

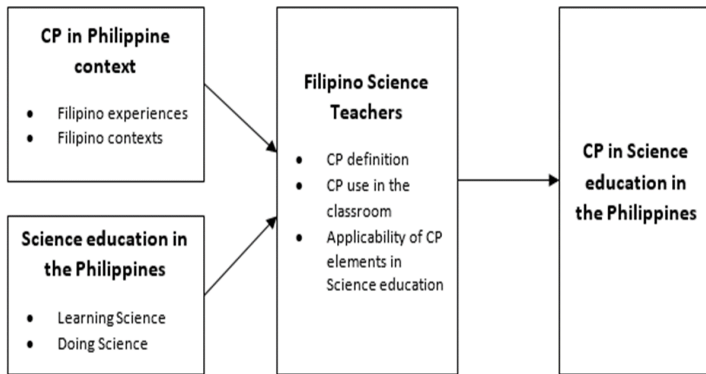


Figure 1. Framework of the Study.

Purpose of the Study

This inquiry aims to contribute to the growing literature on CP in the Philippines and investigates about Filipino teachers’ reflections on CP in Science education. Specifically, this study intends to determine: a) how Science teachers define CP, b) the degree to which Science teachers perceive their use

of CP in their respective classrooms, and c) the applicability of CP elements to Science teaching.

Methodology

This descriptive research describes and interprets CP as applied in Science education. A concurrent embedded mixed-methods strategy was used as quantitative and qualitative data were collected simultaneously (Creswell, 2014). Using qualitative and quantitative methodologies were necessary to look at CP definitions, perceived use in the classroom, and examine applicability of CP elements in Science education.

Participants

Purposive sampling was used in the selection of the eleven (11) participants composed of beginning teachers (n=4), experienced teachers (n=4), and Science coordinators (n=3) from three different schools in Metro Manila. All participants teach Science in basic education. Beginning teachers (1 male and 3 females) were fresh-graduates of Education degrees with one-year practicum experience. Experienced teachers (1 male and 3 females) have at least five years teaching experience. The Science coordinators (all females) have varying years of experience as school leaders.

Instrument

This study utilized a researcher-developed CPSQ adapted from Degener (2001). The extent of CP use was described using a four-point scale: *Highly Critical*, *Somewhat Critical*, *Somewhat Noncritical*, and *Highly Noncritical*. Each rating has a corresponding descriptor in the form of an analytic rubric, which was used in the final CPSQ version. CPSQ contains 52 items with six constructs: aims of education (7 items), structure of the course/subject (7 items), scope of teaching and learning (10 items), preparation of teachers (6

items), teacher-student relationship (9 items), and evaluation of learning (13 items). CPSQ underwent expert validation and reliability testing (Cronbach alpha=.763). In-depth interviews were performed to ascertain how participants define CP and its applicability to Science teaching. Sample interview questions include: a) How do you define CP? Why do you so say so? b) What CP elements do you think are applicable in a Science classroom? Why? c) How can these CP elements be applied in your Science classroom?

Study Context

The study involved participants from three private basic education schools in Metro Manila. School A (n=4) is an exclusive school for girls, School B (n=3) for boys, and School C (n=4) is a co-ed institution. All schools are sectarian schools owned and operated by religious congregations that offer comprehensive basic education. Schools were selected for convenience factors, specifically location. One coordinator and three teachers (except for School B with only two teachers) were assigned by the principal for each school. Both teachers and coordinators were interviewed, while the CPSQ was administered to teachers only.

Data Collection

This six-week study, divided into three phases, utilized interviews and CPSQ to gather data—preliminary stages included participant-correspondence and obtaining the participants' informed consent. Phase 1 involved 30-minute in-depth interviews of the participants in their respective institutions gauging how participants defined CP. Phase 2 involved CPSQ administration to ascertain perceived CP use in the classroom, where participant-anonymity was ensured. Science coordinators were not given the CPSQ since they mostly perform supervisory functions and do not teach Science classes. The researcher facilitated the

distribution, monitoring, and retrieval of the CPSQ from the participants. Phase 3 involved another round of separate in-depth interviews with teachers and coordinators to ascertain CP elements they find applicable in Science classrooms.

Data Analysis

Qualitative data from Phase 1 and 3 interviews were analyzed thematically (Heese-Biber, 2017). Data obtained from Phase 2 were analyzed based on the frequency of CPSQ ‘Agree’ responses. Percentage distribution and frequency count were used to describe the degree of CP use in the classroom

Results and Discussion

Definitions of CP

Two themes (aims and goals and dynamics of use) with indicators emerged from interviews. Table 2 outlines various CP definitions and list of descriptors given by the participants.

Table 2.

Various CP Definitions by the Participants.

Themes	Descriptors		
	Beginning Teachers	Experienced Teachers	Science Coordinators
Aims and Goals	- Establish connection with content	- Develops critical thinking - Develops life skills	- Effective way of teaching - Cater to today's generation of learners
	- Develops critical thinking	- Develops technological skills	- Students justify thinking
		- Develops productive citizens of the country	- Students think about their thinking - Students to doubt what they think

Dynamics of Use	<ul style="list-style-type: none"> - Highly specific - Regards students' contexts - Considers students' varying needs - Caters to different learning styles 	<ul style="list-style-type: none"> - Careful content and strategies selection - Carefully assessing how to teach content - Carefully planned - Facilitates concept discovery - Practical application of learned concepts - Considers students' needs - Regards pressing social issues - Considers societal needs 	<ul style="list-style-type: none"> - Careful planning - Planning classroom approaches - HOTS emphasis - 21st-century skills emphasis - An approach that fits students' skills - Allows students to think further
--------------------	---	--	---

Emerging themes (aims and goals and dynamics of use) share commonality indicative of shared perspectives in defining CP. Beginning and experienced teachers define CP differently from Science coordinators. Beginning teachers briefly define CP while experienced teachers identified several descriptors: life skills, critical thinking, technological skills, and productive citizenship. Experienced teachers were adept at describing the dynamics of CP use, which focused on practical application of learned concepts, integration of social issues, and responding to societal needs. Science coordinators defined CP differently from teachers. The aims and goals of CP described by coordinators were directly linked to their responsibilities as coordinators, focusing on practical teaching methods catering to students' needs. Participants' definitions were highly dependent on training and acquaintance with CP. Despite inadequate exposure, beginning teachers provided 'sound' CP definitions. Experienced teachers and coordinators gave more comprehensive and profound definitions based on CP experience, exposure, and training.

Findings suggest variations in CP definitions among teachers and coordinators, consistent with literature describing multiple perspectives. Teachers' diverging beliefs about teaching using CP, as revealed by varying definitions,

reflect diverse cultural norms and values (Fajardo, 2016). Teachers' inner-reflective processes lead to diverse views about CP use in the classroom (Yakooby, 2011). Embracing a "single, universal definition" of CP digresses from CP's nature as a construct. A movement towards a single 'right' definition of CP demolishes contradictory voices, counter-narratives, and competing understandings (Breuing, 2011), and sidelines contradictions and disagreements. Therefore, the "Filipinization" of CP rests on the transvaluation of Science teaching practices vis-à-vis CP classroom praxis.

Degree to which Participants use CP in the Classroom

CPSQ was administered in Phase 2 to ascertain participants' perceived degree of CP use. Table 3 reflects the participants' perceived degrees of CP use in their classrooms.

Table 3.
Participants' perceived degree of CP use.

Participant	Overall Degree of Use
Beginning Teachers	
BT 1	Somewhat critical
BT 2	Highly critical
BT 3	Somewhat critical/ Somewhat noncritical
BT 4	Highly critical
Experienced Teachers	
ET 1	Somewhat critical
ET 2	Somewhat noncritical
ET 3	Somewhat noncritical
ET 4	Highly critical

Beginning teachers (2 out of 4) perceive using CP more than experienced teachers (1 out of 4). However, beginning teachers are generally idealistic, and their personal teaching beliefs are mostly explained by positive and negative affect, but lacking reflection about classroom

experiences (Schmidt et al., 2017). Beginning teachers' lack of experience suggests an inability to consider preconceived beliefs about classroom practice, such as CP use, thereby explaining more 'Agree' responses. Beginning teachers (93.40%) tend to 'Agree' to statements more than experienced teachers (88.54%). Agreeing to most items may suggest more positive viewpoints despite struggle with the demands of teaching roles, also called "reality/praxis shock" (Goddard & Foster as cited in Edwards & Nuttall, 2015). The degree of CP use was limited to self-perception and not indicative of actual CP use in the classroom since no observations were conducted.

All participants had definite opinions about using CP in the classroom. Noticeably, all beginning teachers were apprehensive in using CP, contrary to their CPSQ Agree responses.

"... [I believe using CP] is okay. It is [actually] good. However, as a beginning teacher, it [using CP] will be effective if the teacher is an expert in using CP. I think using CP needs intense training. If the teacher is not well-informed (surface level only) and prepared, then using CP may not be very effective."
(BT2)

"I think overall CP is good; however, there is a part of me that it gives too much leeway for students (how to learn, what to learn)... students need a certain level of maturity (about Grade 9 or 10) in order for them to decide for themselves."
(BT1)

BT3 and BT4 share similar comments. Beginning teachers remain skeptical towards empowering students' too much because students may abuse the freedom of choosing what to learn and how to learn. Alternatively, experienced teachers and coordinators perceive CP as promising because it makes learning more relevant. Science coordinators argue

that using CP is favorable yet may pose some difficulties, especially if teachers are not trained.

“... It is [using CP] difficult and challenging...but at this [modern] time, I think this is what we should be using CP in our classroom since our students now can access information very easily. Thus, there is a need to train and challenge students to be critical enough to decide which is a piece of credible information” (SAI)

Applicability of CP to science education

Phase 3 involved conducting interviews with teachers and coordinators to investigate their perceived applicability of CP in teaching Science. As summarized in Table 4, participants described how CP applies to Science teaching.

Table 4.

Applicability of CP to Science Education in terms of Content and Methodology.

Themes	Descriptors		
	Beginning Teachers	Experienced Teachers	Coordinators
Content	- Real issues discussion - Students decide what content to learn	- Societal issues discussion	- Community issues/problems discussion
Methodology	- Laboratory work - Community-based researches	- Posing essential questions, ask societal relevance - Examine societal issues, propose solutions through content understanding - Review critical societal issues - Integrate societal issues in research	- Science researches work involve community problems - Applying Science concepts to real-life, new situations during discussions - Questioning validity of content

Similar themes emerged from interviews of teachers and coordinators. Participants identify content and methodology as areas of CP integration in Science teaching. All participants point to discussion of pertinent societal/community issues as possible sources of Science content. Participants posited the application of CP in methodology through Science research projects, community-based researches, issue watching, and proposing solutions to community problems.

In Phase 3, participants considered different CP elements based on the descriptors of Degener (2001). Participants identified and elucidated “applicable” and “non-applicable” statements to Science teaching. Table 5 enumerates items identified as “applicable” and “non-applicable” and cited reason/s.

Table 5.
Applicable and Non-applicable CP Elements to Science Education.

Evaluation	CP Elements adopted from Degener (2001)	Cited Reason/s
Beginning Teachers		
	Learning is a meaning-making process that takes place within specific contexts.	“Science always involves meaning-making processes” (BT2)
	Teachers guide students toward taking action to solve problems.	“... students [in the 21 st century] are compelled to solve problems...using the scientific method” (BT3)
Applicable	Teachers are tuned into the types of literacy materials and practices that students use outside school.	“... students appreciate better if they can relate Science concepts to what they experience outside” (BT4)
	Teachers and students share control of and responsibility for the program.	“...students, teachers should be partners in achieving goals of the subject” (BT4)

	<p>Standardized tests are not used. The success of the course/subject is measured by how well students use the skills they have acquired to negotiate a change in their world</p>	<p>"This one is too ideal... we cannot avoid using standardized tests in Science... we have to test knowledge..." (BT1)</p> <p>"We cannot forgo standardized test... it's needed" (BT2)</p>
<p>Not Applicable</p>	<p>Students are involved in deciding when classes meet.</p>	<p>"If students decide... it's chaotic. An authority must be followed" (BT3)</p> <p>"Students should be followers... nothing [good] will happen if they will decide" (BT4)</p>
	<p>Community members (which include coordinators, teachers, students, and parents) have a partnership role in planning for the course/subject.</p>	<p>"...leave the planning to teachers and coordinators" (BT3)</p> <p>"Content taught should be true for all schools... only one will do the planning (DepEd)" (BT4)</p>
<p>Experienced Teachers</p>		
<p>Applicable</p>	<p>Teachers and students share control of and responsibility for the program.</p>	<p>"... using participatory approach in constructing, designing the subject engages students more" (ET1)</p>
	<p>Community members (which include coordinators, teachers, students, and parents) have a partnership role in planning for the course/subject.</p>	<p>"... most applicable in encouraging dialogue between teachers, students... allows both to discover more from each other" (ET4)</p>
<p>Not Applicable</p>	<p>Students are involved in deciding when classes meet.</p>	<p>"... may go against structure of basic education... plus the idea is a little too foreign" (ET4)</p>

Science Coordinators

	Emphasis is placed on reading, writing, and other activities that help students deal with personal needs and concerns, at home and within the community.	"... very applicable because students are made to analyze content [better] through reading, writing, other activities" (SA3)
	Dialogue between students and teachers helps students to discover their voices.	"...dialogue with students to get to know inner desire of students to learn... some are timid in big groups... dialogue involves exchange of ideas" (SA1)
Applicable	Teachers guide students toward taking action to solve problems.	"Students should take active role and empowered to be responsible for their own learning" (SA1) ".... Science becomes practiced in real life" (SA2)
	Community members (which include coordinators, teachers, students, and parents) have a partnership role in planning for the course/ subject.	"... it is good for all stakeholders to take part in the planning for learning" (SA1)
	Education should be used for personal growth and empowerment.	"... what is meant by personal growth and development should be better qualified. It may be too relative per person" (SA1)
Not Applicable	Students are involved in deciding when classes meet.	"..... it is not the students who decide... teachers and admin are the ones thinking about this for the students" (SA3)

Participants identified common elements "applicable" to Science teaching. The most applicable item based on the frequency count was: "*Teachers guide students*

toward taking action to solve problems.” Participants assert that CP in Science teaching is very much oriented towards problem-solving and using scientific method. This element was perceived as ‘most applicable’ element of CP to Science teaching. Hence, CP can be applied in Science classroom through problem-solving in such a way that critical thinking (Sarroub & Quadros, 2015), 21st-century skills (Agdeppa & Metila, 2017), and literacy skills (Fajardo, 2016; Parba, 2018) are developed.

Participants identified CP use as best actualized through community-based researches/projects dwelling on real-life societal and community issues. Participants had varying responses on the item: “*Community members (which include coordinators, teachers, students, and parents) have a partnership role in planning for the course/subject.*” Beginning teachers asserted this was not applicable for basic education since planning needs is performed by administrators. However, experienced teachers and Science coordinators saw the value of participatory planning by community members. Experienced teachers and coordinators felt more confident engaging other school community members because of their breadth and depth of experience in communicating with other community members (i.e., parents), unlike beginning teachers. Typically, beginning teachers are less comfortable communicating with parents because they lack school knowledge and experience (Rees, 2015). Participatory planning requires re-conceptualizing classroom practices, converging students’ interests, cultural needs, and community empowerment (Sarroub & Quadros, 2015). However, participatory planning places teachers’ classroom decisions into scrutiny using the lenses of power and control (Rocha-Schmid, 2010), leading to a critical analysis of CP use in itself (Marquez, 2017).

The item “*students are involved in deciding when classes meet*” was rated as ‘not applicable’ by all the

participants. As reasoned by the participants, this item does not apply to basic education because of the level of maturity of students to handle such a responsibility of deciding when their classes would meet.

Beginning teachers have a similar level of skepticism on the item: *“Standardized tests are not used. The success of the course/subject is measured by how well students use the skills they have acquired to negotiate a change in their world.”* However, using CP highlights a new assessment paradigm that digresses from the fundamentals of familiar assessment literature (Fajardo, 2016) and focuses on critical analysis and reflection of knowledge-gained and experience (Nouri & Sajjadi, 2014), departing from novice teachers’ “acquire-apply pedagogy” (Zeichner, 2010).

Using CP in the classroom involves the challenge of teachers assuming the role of a facilitator and guide, engaging in meaningful praxis (Ross, 2018) that digresses from the banking model of education (Freire, 1970). Experienced teachers and coordinators show greater appreciation to using CP in Science education such that beginning teachers remain skeptical and theory-centric, focusing on knowledge-acquisition than skills-building. Such that CP use demands situated teacher knowledge or “pedagogical judgment” (Horn & Campbell, 2015), coordinators must provide valuable support and build a community of practice (Edwards & Nuttall, 2015; Fajardo, 2016) in order for CP use to thrive and advance. Teachers using CP in Science education shape and re-shape curriculum and instruction. A teacher using CP must embrace CP’s inherent impermanence (McLaren, 2019) and continuously, using Freire’s words, invent and re-invent curricular and instructional processes.

Conclusions and Recommendations

This study explored Filipino teachers' reflections on CP in science education in terms of a) teachers' definitions of CP, b) perceived use of CP in the classroom, and c) applicability of CP elements to teaching Science. CP, as a pedagogical practice, has not been widely explored in the Philippines. This inquiry fills the literature gap concerning teachers' perspectives on CP and its applicability in the classroom. This study's findings suggest that beginning teachers, experienced teachers, and coordinators have a functional understanding of CP in terms of its aims and goals and dynamics of use, as revealed by their CP definitions. Beginning teachers perceive themselves as highly critical in the use of CP in the classrooms, yet the way they operationalize their understanding of CP remains undernourished. Experienced teachers and coordinators see promise in using CP in the classroom as it makes learning more relevant.

This study reports that CP can be applied to the content and methodology of Science teaching. Science content digresses from static and uniform content and tackles societal and community issues. Methodologies of Science teaching include community-based or technical-scientific research focused on societal issues and real-life community problems, abolishing corporatocracy, and making students' organic intellectuals. By adopting CP in the classroom, Science teachers not only move away perpetuating a banking-model of Science education but also actively respond to the Department of Education's mandate for "contextualization" and "indigenization."

Overall, Filipino teachers' reflections on CP in science education are promising; however, there is still a need to operationalize CP in the Philippine context. The study results were solely dependent on the number of participants (n=11), their responses, and experiences in the classroom.

Future researchers can consider increasing the sample size to validate the CPSQ findings. Engaging participants outside Metro Manila may capture disparities and similarities in using CP in classrooms across various regions. Other research designs, such as case study or ethnography, may also be employed to capture “CP in action.” Furthermore, an analysis of the applicability of CP in the science curricula may be done through the conduct of classroom observations and participant observations. It is also suggested that science educators and coordinators explore CP’s functional elements from the findings of this study in designing instruction that is problem-posing, fostering engagement, interaction, and meaningful learning.



References

- Abraham, G. Y. (2014). Critical pedagogy: Origin, vision, action & consequences. *KAPET, 10*(1), 90-98.
- Agdeppa, J.Y., & Metila, R. (2017). Critical pedagogy-based instructional materials: Effects on language proficiency, social awareness, and 21st-century skills. *Advanced Science Letters, 23*(3), 739-744. <https://doi.org/10.1166/asl.2017.7460>
- Aliakbari, M. & Faraji, E. (2011). Basic principles of critical pedagogy. *International Proceedings of Economics Development and Research, 11*, 77-85. Retrieved from www.ipedr.com/vol17
- Belhassen, Y., & Caton, K. (2011). On the need for critical pedagogy in tourism education. *Tourism Management, 32*(2011), 1389-1396. <https://doi.org/10.1016/j.tourman.2011.01.014>
- Breuing, M. (2011). Paulo Freire: Critical praxis and experiential education. In T. Smith & C. Knapp (Eds.),

Sourcebook of experiential education: Key thinkers and their contributions (pp. 56-64). New York, NY: Routledge.

Burbules, N. C., & Berk. R. (1999). Critical thinking and critical pedagogy: Relations, differences, and limits. In T. Popkewitz & L. Fendler (Eds.), *Critical theories in education: Changing terrains of knowledge and politics* (pp. 45–65). New York, NY: Routledge.

Cho, S. (2016). Critical Pedagogy, Historical Origins Of. *Encyclopedia of Educational Philosophy and Theory*, 1–6. https://doi.org/10.1007/978-981-287-532-7_228-1

Cortez, F.G. (2013). The Philippine engagement with Paulo Freire. *Kritike*, 7(2).

Cortez, F.G. (2016). Critical rethinking of critical thinking: A contribution of critical pedagogy in facing the challenges of K+12. *Kritike*, 10(1), 315-330.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative and mixed methods approaches* (4th ed.). Thousand Oaks, CA Sage.

Crookes, G. (2012). Critical pedagogy in language teaching. In L. Ortega (Ed.), *The encyclopedia of applied linguistics* (pp. 1-9). Cambridge: Cambridge University Press. <https://doi.org/10.1002/9781405198431.wbeal0284>

Datoo, A., & Chagani, Z. A. (2011). Street theatre: Critical pedagogy for social studies education. *Social Studies Research & Practice*, 6, 21–30. <http://dx.doi.org/10.1080/00933104.2016.1211047>

Degener, S. (2001). Making sense of critical pedagogy in adult literacy education. In J. Comings, B. Garner, & C. Smith (Eds.), *Annual review of adult learning and literacy* (pp. 26-62). San Francisco: Jossey-Bass.

- Edwards, S., & Nuttall, J. (2015). Beginning teachers: Issues and experiences. *Asia-Pacific Journal of Teacher Education*, 43(1), 1-3. <http://dx.doi.org/10.1080/1359866X.2014.969415>
- Fajardo, M.F. (2016). *Teaching critical literacy using multi-modal texts to college students in the Philippines*(Unpublished doctoral dissertation). The University of Wollongong. Retrieved from <https://ro.uow.edu.au/theses/4854>
- Freire, P. (1970). *Pedagogy of the oppressed*. New York: Continuum.
- Fulgencio, A.B., Sedilla, B.M., & David, A. P. (2014). Exploring Filipino teacher education students' conceptions of teaching and learning. *Educational Measurement and Evaluation Review*, 5, 91-103.
- Garrett, H. J. & Kerr, S. L. (2016). Theorizing the use of aesthetic texts in social studies education. *Theory & Research in Social Education*, 44(4), 505-531. <https://doi.org/10.1080/00933104.2016.1211047>
- Heese-Biber, S. N. (2017). *The practice of qualitative research*. California: Sage.
- Horn, I.S., & Campbell, S.S. (2015). Developing pedagogical judgment in novice teachers: Mediated field experience as a pedagogy for teacher education. *Pedagogies: An International Journal*, 10(2), 148-176. <http://dx.doi.org/10.1080/1554480X.2015.1021350>
- Katz, L. (2014). Teachers' reflections on critical Pedagogy in the classroom. *InterActions: UCLA Journal of Education and Information Studies*, 10(2). Retrieved from <https://escholarship.org/uc/item/2c6968hc>
- Kincheloe, J. (2012). Critical pedagogy in the twenty-first century: Evolution for survival. *Counterpoints*, 422, 147-183. <http://www.jstor.org/stable/42981758>

- Macugay, E. B., & Bernardo, A. B. (2013). Science coursework and pedagogical beliefs of science teachers: The case of science teachers in the Philippines. *Science Education International*, 24(1), 63–77.
- Marquez, N.L.P. (2017). Critical thinking in Philippine education: What we have and what we need. *Journal of Critical Education Policy Studies*, 15(2), 272-303. Retrieved from <http://www.jceps.com/wp-content/uploads/2017/10/15-2-10.pdf>
- McKernan, J.A. (2013). The origins of critical theory in education: Fabian socialism as social reconstructionism in nineteenth-century Britain. *British Journal of Educational Studies*, 61(4), 417-433.
- McLaren, P. (1998). *Life in schools: An introduction to critical pedagogy in the foundations of education*. New York: Longman.
- McLaren, P. (2019). The future of critical pedagogy. *Educational Philosophy and Theory*, 1-6. <https://doi.org/10.1080/00131857.2019.1686963>
- Moratilla, N.C.A. (2019). Revisiting Paulo: Critical pedagogy and testimonial narratives as liberative spaces in the Philippines' K-12 curriculum. *Journal for Critical Education Policy Studies*, 17(2). Retrieved from <http://www.jceps.com/wp-content/uploads/2019/08/17-2-9-nomor.pdf>
- Nouri, A., & Sajjadi, S. M. (2014). Emancipatory pedagogy in practice: Aims, principles and curricular orientation. *International Journal of Critical Pedagogy*, 5(2), 76–87. <http://libjournal.uncg.edu/ijcp/article/view/228/671>
- OECD (2019), *PISA 2018 Results (Volume I): What Students Know and Can Do*, PISA, OECD Publishing, Paris, <https://doi.org/10.1787/5f07c754-en>

- Parba, J. (2018). *Empowering the Filipino language classroom: Towards critical pedagogy and curriculum* (Unpublished doctoral dissertation). University of Hawaii Manoa. Retrieved from <https://scholarspace.manoa.hawaii.edu/bitstream/10125/62785/2018-08-phd-parba.pdf>
- Rees, R.B. (2015). *Beginning teachers' perceptions of their novice year of teaching* (Unpublished Master's Thesis). Utah State University, USA. <https://digitalcommons.usu.edu/etd/4229>
- Rocha-Schmid, E. (2010). Participatory pedagogy for empowerment: A critical discourse analysis of teacher-parents' interactions in a family literacy course in London. *International Journal of Lifelong Education*, 29(3), 343-358.
- Rodriguez, A. (2014). A Critical Pedagogy for STEM Education. In J. Bencze, & S. Alsop (Eds.) *Activist Science and Technology Education. Cultural Studies of Science Education* (Volume 9), (pp. 55-66). Springer, Dordrecht. https://doi.org/10.1007/978-94-007-4360-1_4
- Ross, E. W. (2018). Humanizing critical pedagogy: What kind of teachers? What kind of citizenship? What kind of future? *Review of Education Pedagogy and Cultural Studies*, 40(5): 371-389. <https://doi.org/10.1080/10714413.2019.1570792>
- Sarroub, L.K., & Quadros, S. (2015). Critical pedagogy in classroom discourse. In M. Bigelow, & J. Enns-Kananen (Eds.), *The Routledge Handbook of Educational Linguistics* (pp. 252-260). New York & Abingdon: Routledge.
- Schmidt, J., Klusmann, U., Lüdtke, O., Möller, J., & Kunter, M. (2017). What makes good and bad days for beginning teachers? A diary study on daily uplifts and hassles. *Contemporary Educational Psychology*

- gy, 48(2017), 85-97. <https://doi.org/10.1016/j.ced-psych.2016.09.004>
- SEI-DOST & UP NISMED, (2011). *Framework for philippine science teacher education*. Manila: SEI-DOST & UP NISMED.
- Shor, I. (1992). *Empowering education: Critical teaching for social change*. Chicago and London: University of Chicago Press.
- Simon, R. I. (1987) Empowerment as a pedagogy of possibility. *Language Arts*, 64(4), 370-382.
- Thiet, R.K. (2017). An Interactive, instant polling exercise to allay student anxiety in science courses. *The American Biology Teacher*, 79(6), 496–498. <https://doi.org/10.1525/abt.2017.79.6.496>
- Thomson-Bunn, H. (2014). Are they empowered yet? Opening up definitions of critical pedagogy. *Critical Forum*, 29. Retrieved from <http://compositionforum.com/issue/29/>
- Viola, M.J. (2012). *Toward a Filipino/a critical (FilCrit) pedagogy: A study of United States educational exposure programs to the Philippines* (Doctoral dissertation). Retrieved from <http://dissertations.umi.com/ucla:10124>
- Viola, M. (2014). Toward a Filipino critical pedagogy: Exposure programs to the Philippines and the politicization of Melissa Roxas. *Journal of Asian American Studies*. 17(1), 1-30. DOI:10.1353/jaas.2014.0004
- Yakooby, T. (2011). Teachers' reflections on the perceptions of oppression and liberation in neo-Marxist critical pedagogues. *Educational Philosophy and Theory*, (2011), 1-13. DOI: 10.1111/j.1469-5812.2011.00830.x
- Zeichner, K. (2010). Rethinking the connections between campus courses and field experiences in college-

and university-based teacher education. *Journal of Teacher Education*, 61(1–2), 89–99. <https://doi.org/10.1177/0022487109347671>