Engaging Creative Pedagogies to Reframe Environmental Learning in an Indonesian Teacher Education Program

Submitted by

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ABSTRACT

Initial Teacher Education (ITE) programs are responsible for producing graduate teachers with strong capabilities, through advancing high quality teaching strategies and evidence-based teaching. With an increased understanding of universities' capacities for delivering social change, an interest in broadening knowledges beyond traditional disciplines has emerged. ITE programs are further challenged to address sustainability and mobilise possibilities. A strategic goal for achieving these expectations is to reorient teaching and learning by connecting them with dimensions of the world beyond a discipline focus, including culture, society, and the natural world.

Leveraging from Lin's (2011) work on creative pedagogy, I explore the teaching and learning experiences of Balinese ITE educators and pre-service teachers (PSTs), which interconnect with several ecological zones within the university. The aim of this inquiry is to obtain and offer insights into how a particular pedagogical strategy – creative pedagogy – supports the establishment of transformative environmental learning, including how it enhances the ITE educators' capacity to scaffold environmental learning, and repositions Balinese indigenous knowledge within an Indonesian ITE program. I also provide an analysis of barriers to practicing creative pedagogies within this higher education context, and signal possible response strategies.

This research is informed by Barnett's (2018) notion of the 'ecological university' and draws on literature, and concepts, that relate to creativity in education, pedagogies in higher education, and meaning-making through an indigenous lens. Each chapter of my thesis is accompanied by a different Balinese metaphor that models ways of integrating cross-cultural knowledge. Using the metaphor of Balinese broom construction in the *sampat lidi*, my study is situated within interpretivist and transformative paradigms. I utilised Kemmis et al.'s (2014) critical participatory action research (CPAR) approaches in semi-structured classroom observations, creative collegial group meetings, and questionnaires with three ITE educators and forty-six PSTs. All participants boast the dual roles of experiencing pedagogies and initiating pedagogical transformation in the ITE program. Data were analysed using two cycles of coding before being displayed as analytic units in a conceptually clustered matrix.

Major findings from my research include the emergence of a creative pedagogies mandala that offers an understanding of pedagogical practices across five ecological zones: knowledge, learning, culture, persons, and natural environment. The mandala reflects the results of an interplay between creative teaching, teaching for creativity, and creative learning, techniques administered by the ITE educators to support the shaping of PSTs' intuitive, collaborative, and reflective skills. The mandala encompasses appropriate pedagogical strategies that are sensitive to indigenous perspectives. The mandala creates a third space for Western and Eastern cultures to interact after creativity and environmental learning, and grounds the indigenous Balinese ways of knowing nature within Western-style ITE classrooms.

I pose that creative pedagogies promote the involvement of the ITE educators and PSTs in a more sustainable learning, and support individual and future wellbeing within a world full of uncertainty and ambiguity. Although this research was conducted prior to the pandemic, my findings signal that it is imperative for an ITE program to allow a space for ITE educators and PSTs to experiment with learning, perform risk-taking pedagogical actions, and re-connect with their local places and communities in order to build resilience amidst unprecedented circumstances in the post-COVID era.

DECLARATION OF AUTHENTICITY

I, I Gusti Agung Paramitha Eka Putri, declare that the PhD thesis entitled Engaging Creative Pedagogies to Reframe Environmental Learning in an Indonesian Teacher Education Program is no more than 80,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references, and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.

I have conducted my research in alignment with the Australian Code for the Responsible Conduct of Research and Victoria University's Higher Degree by Research Policy and Procedures. All research procedures reported in the thesis were approved by the Victoria University Human Research Ethics Committee (VUHREC) [Approval ID: HRE18-246].

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Signature Date 12 December 2021

DEDICATION

To my mother and father, Ibu Puspa and Jik Lembho, who have always believed in me. Thank you for being consistently positive about my academic journey and taking care of my fur babies while I am away. To my younger sisters, Gek Dwi and Gek Tri, you are next. My heartiest wish is for you.

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LIST OF ABBREVIATIONS

CAR: Classroom Action Research

CCG: Creative Collegial Group

CP: Creative Pedagogies

CPAR: Critical Participatory Action Research

EE: Environmental Education

EfS: Education for Sustainability

EL: Environmental Learning

ESD: Education for Sustainable Development

ITE: Initial Teacher Education

KWL: Know-Want-Learn

PST: Pre-service teachers

SCL: *Subak* Cultural Landscape (also known as *subak*)

STSE: Science, Technology, Society, and Environment

TPACK: Technological Pedagogical Content Knowledge

ZPC: Zones Pie Chart

PUBLICATIONS & PRESENTATIONS ARISING FROM THE RESEARCH

Journal Articles:

Surata, S. P. K., Puspawati, D. A., Ariati, P. E. P., & Putri, I G. A. P. E. (2021). The ecological views of the Balinese toward their subak cultural landscape heritage. *Environment, Development and Sustainability*. https://doi.org/10.1007/s10668-021-01979-9.

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Surata, S. P. K., Arjaya, I. B. A., Puspawati, D. A. & Putri, I G. A. P. E. (October 2020). Subak as biocultural diversity-heritage framework at the 1st International Conference of Innovation on Science and Technology for Sustainable Development (ICISTSD), University of Mahasaraswati, Indonesia.

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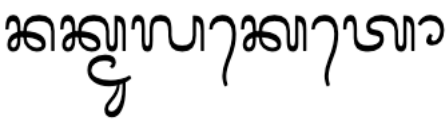
Achievements:

Runner up of Visualise Your Thesis (VYT) 2020 at Victoria University with a presentation entitled *Reframing environmental learning through creative pedagogies*.

CHAPTER 1: BACKGROUND TO THE STUDY

Presenting the Metaphorical Concepts that I live with that have Guided this Research



Nak Mula Keto

It was ever thus

As a Balinese person working in the field of teacher education, I often wondered about connections to traditional Balinese knowledge in both my teaching, and trainee teachers' eventual teaching, in schools. This thesis is the product (to date) of my journey of exploration and research into ways of combining my traditional cultural knowledge with Western-style academic ways of knowing and learning. I belong to a traditional society that is heavily reliant on the wisdom of *nak mula keto,* translated as 'it was ever thus'. *Nak mula keto* is deeply embedded within the Balinese community and is used as a common reply from the elderly to any questions related to Balinese culture, indigenous perspectives, and religious practices. Those who seek answers about our Balinese perspective may be left unconvinced by, or even disappointed in, this vague response. In my younger years, I often encountered this unsatisfying reply when I asked my grandparents to explain the meanings or stories behind certain offerings and rituals. My personal experience resonates with Picard (2017), who suggests this phrase has become so embodied within the Balinese culture, that they seem to practise rituals without needing to comprehend the meanings behind these rituals. This incurious following of ritual and rite not only influences people to change religious beliefs (Picard, 2017), it also supresses discussion, debate, and learning about the culture. In contrast to a more Western approach of voicing knowledge through arguments, the Balinese people value harmonious relationships between individuals, and so avoid becoming involved in discussions that may lead to arguments about rituals or traditions. *Nak mula keto* also reflects Balinese people's pragmatic approach to life: do more and ask less. The phrase justifies why Balinese people choose to immerse their daily lives in

rituals and ceremony rather than sit together and discuss philosophies. Balinese manifest their indigenous ways of knowing in community engagement, the arts, and performances.

According to Lanus (2022), the philosophy of *nak mula keto* in Bali was founded during *mababaosan* (an ancient tradition to unpack the underpinning Vedic concepts or spiritual messages) to curate rituals and religious events. *Nak mula keto* signifies the elders' critical appraisals of indigenous knowledge gaps i.e., their inability to logically explain and oppose the Vedic injunction, injunction of restriction, and injunction of exclusion. Accordingly, this old saying indicates a closure of debate – that those traditional rituals mentioned in Veda are indispensable. In contrast to my prior understanding of *nak mula keto*, this underpinning philosophy offers a fresh perspective to me. Traditional rituals are held to mark transitions of human life which usually involve changes of lifestyle. Individuals who embrace the *nak mula keto* philosophy are said to be more likely to experience self-transformation as they practise the rituals in the cyclical nature, compared to those who merely dedicate to discover the origin or structure of rituals.

As a teacher educator, I work in a Western-style academic environment permeated with many ways of thinking; in stark contrast to my Balinese heritage and isolated from traditional Balinese knowledges. This is challenging and creates a tension where two separate discourses of my life are in conflict. This experience leads me to believe that I am in the peculiar position of being able to address this point of divergence. Hence, I will draw upon my traditional wisdom, *nak mula keto*, and a Western-style research methodology, to shed light on the phenomena that have challenged my thinking. I believe that Balinese ways of life have been predominantly studied by Western scholars (Bateson, 1985; Creese, 2019; Geertz, 2008; Lansing, 2006; Picard, 2017) and, while analysis of Balinese indigenous knowledge in this research has a rich interpretation of context and many possible truths, they are ethnocentric or, as suggested by Smith (2012), they are constructed around Western views. It is imperative to foreground reflexivity to explore how meanings (meanings given to, and generated by, this research) are constructed within the research process in multiple modes, for instance deeming stories, metaphors, and allegories as observed facts rather than inventions

(Scott & Usher, 2010). In my inquiry, I see opportunities to embed my Balinese indigenous knowledge in my research practice by presenting my research through the lens of the metaphorical concepts that I live with. These metaphors are outside of the conventional (Western) conceptual system, which, according to Lakoff and Johnson (2003), means my cultural metaphors potentially offer a new way of understanding an experience. As suggested by Scott and Usher (2010), I acknowledge these metaphors as facts from my lifelong observation of being born and raised as a Balinese.

Five metaphors interweave through the chapters of my thesis, while two metaphors help articulate my findings. I also present metonymies from Hindu-Balinese religious symbolism (e.g., *manah, buddhi,* and *ahamkara*) in the findings chapter (Chapter 4) to understand the concept of learning development. In this research, metaphors, including metonymies, are grounded in my lived experience with Balinese religious and cultural concepts, and serve to structure my research (Table 1).

Table 1 – Metaphorical concepts that interweave my thesis chapters

Chapter	Metaphorical Concepts	Meaning(s)	Purpose
1	*Nak mula keto*	It was ever thus	To understand the rationale of this research
2	*Gebogan*	Amount	To learn the process of reviewing literature
3	*Sampat lidi*	Broom	To untangle the methodology used in this research
4	*Tumpek Landep*	Sharp	To gauge the concept of learning from Balinese indigenous ways of knowing
	Canang	A beautiful purpose	To comprehend the layering features of creative pedagogies for environmental learning
	Ganesha	Representation of knowledge, wisdom, and learning	To understand the position of teacher educators in the Balinese context of ITE program
5	*Desa, Kala, Patra*	Place, time, and circumstance	To conclude this research

Focus of the Study

This doctoral project investigated the ways in which Initial Teacher Education (ITE) educators understood, and engaged with, creative teaching approaches. Lin's (2011) creative pedagogy framework was used to facilitate engaging ways to present the concept of environmental learning with ITE students across various courses (units of teaching). The ITE educators who participated in this research work at a Western-style university and live on an Indonesian island where the major population adhere to Balinese Hinduism. Along with wanting to understand creative ways of effectively engaging students with understandings about environmental learning, I was also interested in considering how creative pedagogies performed by the ITE educators encompass interactions with traditional elders, indigenous ways of knowing, and cultural heritage sites.

Rationale for the Study

Universities are dynamic institutions that constantly alter their priorities. Knowledge development has been a central focus of universities ever since their establishment, although Barnett and Bengtsen (2019) argue that 'knowledge is now characteristically situated in its economic contexts' (p. 1). The landscape of twenty-first century higher education is shaped by a learning format and delivery of instruction that aims to support the development of learners' competencies to face the future job market (Bregman, 2017). It implies that the very idea of a university revolves around a set of public goods (e.g., knowledge, entrepreneurship, wisdom, criticality, and learning) in which one is preferred over another (Scott, 2020). Some demands of higher education in Australia are, for example, to increase diversity among students as well as to participate actively in resolving issues with the world's economies, environments, democracies, and philosophies (Forsyth, 2014; Glyn, 2017).

In the Indonesian context of higher education, the contemporary primary social goods focus has been on Western style imperatives that gesture towards creative economic drivers, such as innovation, creativity, autonomy, and competitiveness. With the launch of the *Merdeka Belajar–Kampus Merdeka* (translated as *Freedom to Learn–*

Independent Campus) program in 2020 (Ferary, 2021), the Indonesian government shifted the educational purpose of universities from nurturing learning and knowledge growth to preparing graduates for participation in the global workforce. Interdisciplinary learning and networking across cultures are the main highlights of the *Merdeka Belajar–Kampus Merdeka* program, during which academic activities may be undertaken for up to three semesters at other universities or industry places. Although reports may yet examine its enactment, the national program offers a promising and liberating experience of learning within ecologies of less segregated disciplines and fields of knowledge.

There is inevitably a need to balance the primary social goods within universities in our more precarious contemporary times. A performative culture, such as academic excellence and graduate employable skills foci, reflects a dominant focus on the economic realm – while wider problems of social, personal, and planetary wellbeing are waiting to be responded to (Barnett, 2018). Some scholars of sustainability interpret the interplay between social, personal, and planetary wellbeing by putting Mezirow's (2009) transformative learning theories into practice (Blake et al., 2013; Boström et al., 2018; Sterling, 2001; Thomas, 2009). A few scholars sought to reframe pedagogical practices to accomplish effective learning at individual and social levels (Rodríguez Aboytes & Barth, 2020). Other researchers have drawn upon creative approaches to develop ecological perspectives on the interdependence between the individual, community, and nature (Inwood & Taylor, 2012; Leduc & Warkentin, 2006). An alternative future for universities is of connecting person, society, and environment through an interdisciplinary integration of knowledges from different disciplines, with far-reaching implications (Bhaskar, 2010; Giatti, 2019). Thus, with what scholars already know, and have demonstrated by promoting sustainability, a change can be exercised in the domain of pedagogies by deploying practices from various disciplines. Experimenting with creativity to shape personal reflexivity, building bridges across indigenous and non-indigenous world views to transform science, and sharing social initiatives to establish a learning community are a few examples of enacting interdisciplinarity to weave other ecosystems into the university (Barnett, 2018).

Barnett's (2018) model of the ecological university offers a new framework for understanding contemporary universities, with a focus on connecting them with several zones of the world (i.e., knowledge, learning, culture, persons, economy, society, and natural world). To strengthen the university's connection to the natural environment, Barnett suggests reorienting curricula and pedagogies in the direction of global environmental degradation. While the idea of the ecological university demands further investigation, Barnett's recommendation demonstrates possibilities of putting pedagogical change together with environmental learning (a term allied with popular descriptors such as *Education for Sustainable Development* and the seminal 'umbrella term' *Environmental Education*) to support the premise of an ecological university. Barnett's idea of an ecological university provides a model for this study to connect university knowledge work with the local Balinese context.

Environmental learning comprises the development of ecological thinking, which may stimulate eco-friendlier ways of being in the world. To bring varied perspectives to higher education, alternative worldviews of environmental learning should be approached, for example shifting from transmissive towards transformative learning, promoting both first- and second-order learning, and discovering pattern recognitions and connections using ecological views (Sterling, 2001). According to Sterling (2001), realisation of environmental learning attaches to a pedagogy, which can facilitate whole systems thinking – that extends, connects, and integrates *ethos* (beliefs and courses of actions/conceptual dimension), *eidos* (how we envisage the world/perceptual dimension), and *praxis* (manifestation and action/practice dimension). Sterling's belief shows a key priority in choosing a relevant pedagogy for environmental learning lies in its capability for bringing agency, which can be found with creative pedagogies. Creative pedagogies is an 'imaginative and innovative arrangement of curricula and teaching strategies' (Dezuanni & Jetnikoff, 2011, p. 264), which offers a third space for bridging cultures (Lin, 2014) and of transformation (Tasler & Dale, 2021). Integrating the two distinctive generative spaces of environmental learning and creative pedagogies in this study demonstrates possibilities of forging new relationships between the teachers–students, educational institutions, and the world. Just as 'creativity cannot be separated from the disciplinary context(s) in which it is enacted' (Hetherington et al.,

2019, p. 275), the idea of creative pedagogies for environmental learning implies interdisciplinary practices, in which creative pedagogies support environmental learning for both teachers and students in the university.

Personal Orientation to the Research

In my teaching work in the field of ITE education I have long wondered about the possibility of including environmental learning activities, which are more inquiry focused and less indoctrinatory in nature, as is more the Balinese style for developing environmental knowledge. Experimenting with environmental learning, I presented topics of environmental degradation through debates over three years. My aim was to stimulate the critical thinking of pre-service English teachers in comprehending problems found in their local environment. During this period of my constant search for innovative teaching strategies, I was also involved in place-based education organised by one of my colleagues who taught in another study program. I became more aware of the social and cultural context of environmental education as I engaged in active learning through various roles, such as an interpreter, a field research assistant, and a workshop developer for Indonesia–Australia bilateral plant biosecurity initiatives in 2016. In the same year, I also hosted discussions with The Rockefeller Global Fellows in Social Innovation, who came from different disciplines (e.g., STEM, social science and humanities, and environment), to sculpt ideas to tackle complex problems within the *subak* cultural landscape (SCL). Another valuable opportunity was afforded to me by UNESCO and Universiti Teknologi Malaysia where I was invited to design and deliver a master class on man, biosphere, and natural world heritage in 2017. I was fortunate because these multidisciplinary learning programs were rare in the context of Indonesian higher education. As Santoso and Widyawati (2020) describe, the national policy of Indonesian higher education emphasises an academic linearity where research, teaching, and learning is focused on a singular discipline rather than a multidisciplinary approach. These roles challenged my perspectives on my teaching practice and academic identity.

I began to seek learning approaches that would encourage my students to participate in eco-friendlier actions. As Freire (2005, p. 27) suggests, ‘teaching is not coddling’, hence

students should be challenged to establish consistency between discourse and practice: a discourse about the complexity behind environmental issues and the merit of collective individual practice in conserving nature. At the same time, I contemplated my identity as a Balinese. I questioned ways to (re)introduce Balinese knowledge and life philosophy to my classroom. This stage led to me obtaining research funding from the Ministry of Research and Technology of the Republic Indonesia to investigate teaching strategies that green ITE classrooms, and a travel grant from the National University of Singapore (NUS) to attend an international research symposium. Despite having to decline the research funding as I accepted a scholarship offer from Victoria University, my presentation at the NUS conference was published (Putri, 2018). An excerpt from the article highlights the PSTs' collaborative learning experience through digital storytelling (DST):

> The use of DST could promote language learners' awareness of environmental education in which a localised theme could be presented. As was evidenced by this research, DST is a compelling instructional tool for prospective teachers especially in nurturing their criticality of their local environment to establish critical language pedagogy in the ELT department. The findings show that prospective teachers delivered multidimensional problems regarding subak as well as feasible solutions to the problems. (Putri, 2018, p. 343)

These diverse opportunities and learning experiences have provided the basis of this inquiry. Further guided by the infamous Balinese phrase *nak mula keto*, I would challenge my thinking: with my position as a Balinese emerging researcher working within a Western style university system, how could I possibly (1) promote the wisdom of elders; (2) embrace my spiritual values, traditions, and practices that reflect connections to nature; and (3) discover ways that enable other individuals to learn, instruct, and experience these indigenous systems of knowing? These questions act as a guide for me in planning, conducting, and reporting my research into reframing teacher education within a Balinese context. As Manathunga (2014) contends, an intercultural doctoral work like this thesis has a potential generative power for knowledge construction from a different angle.

My thesis becomes a home with a space to preserve connections between the past and present. Borrowing Denzin and Lincoln's (2011) term of 'bricoleur', I position myself as someone who constantly collects, interprets, and disseminates stories to rebuild these

connections. Through my experiment with theoretic linguistic knowledge of Balinese metaphors that I live by, my thesis becomes what Manathunga et al. (2021) call a work progressing towards epistemological inclusion of indigenous knowledge into the domain of doctoral studies in the dominant Western/Northern knowledge production. The various factors elaborated above have contributed to the development of my inquiry, which is outlined in the following section.

Issues to be Investigated

This study focuses on investigating the reframing of teacher education in a Balinese context and explores the experiences of ITE educators in designing, implementing, and evaluating creative pedagogies to reposition environmental learning in an Indonesian teacher education program. By engaging in critical participatory action research with a small group of ITE educators, the aim of this research is to gain and share insights into how changes of perspective and pedagogical practice occur through professional group meetings and classroom practices, to consider how creative pedagogies may influence the ITE educators' capacity for delivering environmental learning to pre-service teachers. Complexities that emerge because of practice change will be explored, including strategies undertaken by the ITE action research co-participants to manage these complexities. As the ITE educators, who are the focus of my study, reside and work on an island that is well-known for its traditional lifestyle, this study signals how local indigenous culture may contribute to the way environmental learning is presented in ITE programs.

Theoretical perspectives from the fields of creativity, such as creativity, learning, environmental education, and literature related to indigenous knowledges and practices, have been explored and considered in this inquiry. These fields have been examined to develop the following questions (one primary question and three sub-questions) that guide this study research to address the problem of connecting local ecologies with the Western-style university knowledge ecology:

1) How do creative pedagogies support the establishment of transformative environmental learning in an Indonesian teacher education program?

Along with this primary question, the following sub-questions also shape this study.

1) In what ways do creative pedagogies develop teacher educators' capacity to scaffold environmental learning in a small group?
2) What are the barriers to, and strategies for building effective creative pedagogies for environmental learning in a small group of teacher educators?
3) How do creative pedagogies bring indigenous knowledge and practice to the foreground of environmental learning in an Indonesian teacher education program?

Significance of the Study

This research contributes to the emerging discussion in academic circles, that collective self-reflective inquiry among lecturers to transform pedagogical practices could be anchored in their lifeworld: culture, society, and person identities (Kemmis et al., 2015). This inquiry reorients the focus of a study program in an ITE institution to secure and sustain natural environment, traditional cultures, and a learning community through creative pedagogies. Thus, the methodology and findings of this study could assist in complementing works that relate to the 'third' (Lin, 2014; Tasler & Dale, 2021), or generative space, where indigenous and Western ways of learning enmesh. This innovative intercultural work is a model for other researchers. Designed in 'critical participatory action research' (Kemmis et al., 2014), this study also offers a more fine-scale perspective of relationship (1) among lecturers, (2) between lecturers and students, and (3) between lecturers, students, and people with whom they interact, to advance theoretical understanding and practice of creative re-envisioning in higher education.

Emerging evidence predominantly examines creative pedagogies in the context of children's learning (Cheung, 2016; Cheung & Leung, 2013; Liao et al., 2018; Lin, 2010, 2011, 2012, 2014). As mentioned in a review by Cremin and Chappell (2019, p. 27), 'ways to acknowledge and articulate the dynamic complexity of creative pedagogies need to be found.' This study draws on first-hand experiential narratives from ITE educators and PSTs about the dynamics of creative pedagogies. This inquiry also discusses creative pedagogies through a more culturally specific contextualised approach. This study is situated within the Balinese context of ITE program, and thus

this study sheds light on ways of understanding indigenous peoples' practice of sustainable lifestyles, what Sterling (2001) refers to as care and conserve lifestyles rather than compete and consume lifestyles. These factors align with emerging evidence of the need to investigate creative pedagogies as a third space beyond cultural bridging, as articulated by Cremin and Chappell (2019).

For the ITE educators who participate in this research, it provides them with opportunities to work collaboratively with their colleagues in designing creative pedagogies, to reflect on their pedagogical changes, to share stories of experience in enacting environmental learning, and to receive feedback that potentially improves their practice. There also lies the possibility of gaining a deeper understanding of how learning could be best facilitated, in addition to receiving responses from PSTs whom they interact with. The enhanced framework of creative pedagogies that is generated from this inquiry may be useful for application within a diverse range of educational settings.

A personal level, this study engages me in an independent scholarly journey, which involves critical reflection, synthesis, and evaluation. This academic inquiry develops my understanding of research methodologies to extend and redefine existing knowledge in the field of education. In relation to my past role as a teacher educator, the task enriches my understanding of how meaning-making can be administered in, and beyond, the classroom. This knowledge will not only assist me in enhancing my teaching practice to facilitate the learning of PSTs, it will also assist me in establishing learning collegiality or community that is meaningful for fellow educators.

Limitations of the Inquiry

All research has its limitations and as a researcher there is an obligation to report limitations of a study so that clear directions of future research can be identified (Greener, 2018). Price and Murnan (2004) define a limitation of a study as 'the systematic bias that the researcher did not or could not control and which could inappropriately affect the results' (p. 66). Limitations should be adequately acknowledged, understood, and avoided when researchers can, but recognition of trade-

offs to attend to, and address, the limitations is of vital importance (Collier & Mahoney, 1996).

In this research, the first limitation is the small number of participants. This limitation is considered to be one of external validity, where it cannot accurately assess the entire target population. However, generalisability is not the intention of this inquiry. The aim of focusing on a small sample size is to generate information-rich data to describe and deeply interpret the experiences of ITE educators in enacting creative pedagogies for environmental learning. Drawing from ITE educators' first-hand experience, this study offers a model for permeating creativity into the teaching and learning of various disciplines. The ITE educators' narratives will be complemented with PSTs' voices, with a range of responses from PSTs who experience changes of learning collected through survey metrics to support the contextualisation of complexities and opportunities associated with creative pedagogies. This additional response gives greater sensitivity to interpreting and understanding the learning experience scaffolded by ITE educators' creative pedagogies.

The second limitation is potential biases brought by my position as a staff member of the university where this inquiry is undertaken. These biases may affect the quality of the data, such as the generation of a shallow interpretation of responses, a distortion of inferences, a disregard of barriers, and an abundance of one-sided perspectives (Bergen & Labonté, 2020). Considering the reflexive nature of this inquiry, trustworthiness is built by conducting member checks and peer debriefing with the research co-participants. Further account on strategies to minimise the impact of biases is presented in the methodology chapter (Chapter 3).

Overview of the Study

My Balinese knowledge is woven throughout the thesis as intercultural work connecting Western and Balinese ways of knowing. Each chapter of this thesis begins by introducing a Balinese metaphor or saying that I live with that reinforce the key aspects of the chapters. In the beginning of this chapter, I have described the metaphorical concepts that will guide this thesis. Having articulated the nature and context of my

inquiry, I continued by presenting a brief account of personal aspects that have led me to this research. I also mapped the focus of the investigation within this inquiry, along with the significance and limitations of this research. In Chapter 2, I examine literature that relates to theoretical foundations and frameworks to explore creativity, learning, and indigenous knowledge to consider pedagogy for environmental learning. Chapter 3 contains the methodology used for this study: interpretive/transformative paradigm. Justifications for critical participatory action research as the design of this study are also outlined. The process of inviting participants, gathering data, and issues that arise from using this approach are detailed further. In the end of Chapter 3, I outline the methods of analysing data. In Chapter 4, I discuss the findings and interpretations of this inquiry by linking them with materials that were examined in the literature review chapter. I then present a summation of the study research, which includes synthesis and concluding remarks, in the final chapter (Chapter 5).

CHAPTER 2: REVIEW OF THE LITERATURE

Metaphorical Concepts that Guide this Chapter

gebogan

High offerings

A *gebogan* is an offering dedicated to *Ida Sang Hyang Widhi* (God), consisting of beautifully stacked fresh produce (fruits and flowers) and cakes on a single-footed wooden food tray (Figure 1). The components of a *gebogan* are then attached to a banana tree trunk with bamboo skewers. The *gebogan* is designed in the form of a tower that represents mountains – the sacred dwellings of the gods. The *gebogan* embodies an amount, sum, or set of harvest products that are to be traditionally offered at a temple, as most Balinese people worked as farmers in the past. Thus, the size of the *gebogan* varies from one to another, depending on the individual's harvest size and sincerity. The tallest *gebogan* could reach up to one and a half metres. Women and girls walk to the temple carrying *gebogan* on the top of their heads for a blessing (Figure 2). Carefully and intentionally stacking fruits and flowers the length of a *gebogan* reflects the Balinese people's patience and perseverance in achieving their goals. The process of writing this chapter is like making a *gebogan*. Like choosing a strong banana tree trunk for the framework of my *gebogan*, I reviewed numerous resources in order to present a critical narrative of the space that my work builds on. The art of sorting and attaching fruits and cakes to the banana tree trunk with bamboo skewers represented how I synthesised, and carefully structured, the literature that offered interpretations of creativity, pedagogies, and learning. This process required patience and criticality, from paraphrasing authors' ideas, dealing with the gaps in literature, writing a compliant chapter in an inverted pyramid style, to continuously tweaking while my research progressed. I completed my *gebogan* of literature review by signalling the potential contribution I will make in the field of creative pedagogy and environmental learning –

the finishing touch of putting *sampian* (coconut-leaf and flower ornaments) on the top of the *gebogan*.

Figure 1 – Gebogans are blessed in a temple event

Figure 2 – Women are ready to go home, carrying gebogan on the top of their heads

In this chapter, my *gebogan* of literature review is stacked in the following order: (1) wonderings about creativity; (2) the tenets of learning; (3) indigenous knowledge and practice; and (4) creative pedagogies for environmental learning. I will now start with the first stack: to discuss creativity in education.

Wonderings About Creativity

Creativity is often identified as one of the essential skills to cultivate for success in the twenty-first century, encompassing values such as confidence, care, courage, and curiosity (Trilling & Fadel, 2009). With the emergence of the COVID-19 pandemic, the foundations of our society were shaken further by uncertainties. Our world, which was already full of engaging challenges, is now reshuffled into a new and constantly changing ecosystem. Hence, there is a need to reshape our teaching and learning landscape to prepare teachers and students with the resilience to adapt to a new living ecosystem, including to maintain their career path (Baron & Baron, 2019) and to sustain their growth (Mansfield et al., 2018). McKay (2021) describes being resilient as 'knowing how to activate personal and contextual resources to enact agency and promote well-being despite the constraints of the context' (p. 2). This section of the literature review encompasses a discussion about creativity from various perspectives as an attempt to understand why, and how, creativity should be developed within our educational settings to build 'socio-ecological systems' features such as resilience, adaptability, and transformability (Biggs et al., 2021; Walker et al., 2004). I will focus on teacher education settings, as Initial Teacher Education (ITE) educators and pre-service teachers (PSTs) are two groups with a direct engagement in designing, enacting, and evaluating creative initiatives within classrooms, as well as managing the engagement and nurturing of creativity for future citizens.

The Riddle of Creativity

Creativity is enigmatic and complex, which provides a reason for why creativity has been studied extensively from various perspectives. Early studies about creativity, according to Ames (2014) and Glăveanu and Kaufman (2019) focused on the etymological roots of creativity. Derived from the Latin verb *creare*, creativity refers to

making something exist, and was closely associated with the divine (*creatio in nihilo*) rather than the human (*creatio in situ*). The notion of the creative divine is still distinctively represented within societies' mythology. According to Mason (2003), creative characters in Norse, Native American, Babylonian, and Greek mythology are commonly the ambivalent tricksters, blacksmiths, or gods, and are illustrated as inventive yet cunning. In Balinese Hinduism, the feminine deity *Saraswati* possesses characteristics of knowledge, creative arts, wisdom, and purity with a calm and compassionate nature, where, in contrast, in Tibet and parts of India she is also portrayed as the destructive *Nila Saraswati*. These creative characters and deities are attributed with the shared contradictory features associated with creativity, such as being both intellectual producers and immoral, resourceful and deceitful, angelic and wicked, or life supportive and threatening (Glăveanu & Kaufman, 2019). These binaries identified in these myths highlight the same message about creativity: the divine enkindles inspiration for the audience, but the audience should avoid risk-taking actions or offending the gods. The perspective of creative characters described here will be explored further in my findings since my inquiry is undertaken in a society devoted to deities, or as Geertz (2008) describes, as having an intricate and obsessive ritual life. Thus, there is a likelihood that the views of those in my study have been primarily shaped by traditional mythologies, as stated in Chapter 1.

The notion of creativity in some contexts is also perceived as a trait that should not be developed in radical and provoking forms. For example, in East Asian societies, Shen et al. (2018) argue that 'there is both a stronger desire for creativity and greater fear and rejection of radical creativity' (p. 318). Radical creativity is defined by Gilson and Madjar (2011) as ideas that are considerably distinct from current practices and preferences. Opposed to incremental creativity, in which modifications to existing practices and products occur, radical creativity is an outcome of problem re-examination, re-definition, and reformulation in the early stages of a task (see also Jarman, 2014). For the societies mentioned earlier, Shao et al. (2019) suggest that incremental creativity is more acceptable because this creativity is viewed as a venture to reinterpret and rediscover tradition rather than to escape from tradition and progress beyond what currently exists. Shao et al.'s point of view has enlightened me in

determining a type of creativity that likely suits the co-participants I work with during this research, who are embedded in the ritualised society of Bali.

Before including creativity as a focus of our teaching, we ought to know that the term 'creativity' does not always indicate a positive trait; it often represents an act of folly. Kaufman et al. (2019) advises us to value creativity in a social context from its pure contribution, whether that is positive, negative, or neutral:

> *Positive creativity* is the generation of an idea or product that is both novel and useful or effective in some way but that also serves a positive, constructive function for the domain or field in which it is useful or effective. Conversely, *negative creativity* is the generation of an idea or product that is both novel and useful or effective in some way but that also serves a negative, destructive function for the domain or field in which it is useful or effective. *Neutral creativity* is the generation of an idea or product that is both novel and useful or effective in some way, and that serves neither a positive nor negative function for the domain or field in which it is useful or effective. An idea or product can be positively creative at one time or in one place and yet negatively creative at another time or in another place. (Kaufman et al., 2019, p. 734)

Livingston (2010) exemplifies Hitler as a creative human being who applied his creativity with an absence of meritorious goal. This concept of creativity has been discussed in literature recently as being *malevolent creativity* or *negative creativity*. Harris et al. (2013) define *malevolent creativity* as creative actions and products 'that are intended to materially, mentally, or physically harm oneself or others', such as spreading hoaxes, abuse, terrorism, aggressive humour, spying, and counterproductive work behaviours (p. 237).

As malevolently creative ideas are damaging, Harris et al. (2013) suggest schools design intervention programs based on emotional intelligence to gauge understanding about students who are likely developing this construct of creativity. The aforementioned damaging effect is further investigated by Qin et al. (2020), in which they reveal leaders with a malevolent creative mindset tend to justify inappropriate treatment towards their subordinates. Concerning impeding *malevolent creativity*, it is essential to administer creative process in education that Livingston (2010) suggests can place creativity around social justice and other objectives for the common good. In achieving these common good objects, Osborn's (1953) seminal brainstorming

technique to balance our *judicial minds* and *creative minds* may be helpful where 'our thinking mind is mainly two-fold: (1) *a judicial mind* which analyses, compares, and chooses; (2) *a creative mind* which visualises, foresees, and generates ideas. Judgment can help keep imagination on track, and imagination can help enlighten judgment' (Osborn, 1953, p. 93). Osborn defines brainstorming as 'using the *brain* to *storm* a creative problem – and to do so in *commando* fashion, with each stormer audaciously attacking the same objective' (Osborn, 1953, p. 297). Due to the nature of brainstorming, it is worth noting that good leadership is crucial to achieve a successful brainstorming session. Brainstorming develops group dynamics as it offers individuals a space for generating unconstrained ideas ('freewheeling') and contributing to their fellow members' ideas ('piggybacking') (Henningsen & Henningsen, 2018), and thus the leader should remind participants that ideas produced are not to be judged during the brainstorming session but afterward (Osborn, 1953). Osborn's brainstorming technique has stimulated the development of collaborative brainstorming techniques, such as 'concept mapping' (Moon et al., 2011) and 'evocation of constraints' (Bonnardel & Didier, 2020). I will apply this variation of brainstorming techniques within my data collection phase to generate and explore ideas by the ITE educators in relation to creative pedagogies.

It is also imperative for educators to consider consequences (positive, negative, or neutral) of creative actions, rather than merely generating novel ideas. Two strategies that work together to develop positive creativity and assess the consequences of our creative actions are perspective-taking and empathy (see also Grant & Berry, 2011; Hoever et al., 2012; Kaufman et al., 2019). While perspective-taking and empathy have been introduced by Carl Rogers (1972) in psychotherapy, they are often mentioned as possible ways of understanding creativity in education (for example Harrington et al., 1987; Hui et al., 2019). Positive creativity is closely related to being ethical, which Sternberg (2013) believes is necessary for wisdom. However, the merits of positive creativity have yet to be explored aside from the positive outcomes of creativity on academic achievement (for example Batdi & Batdi, 2015; Elaldi & Batdi, 2016; Gajda et al., 2017) and management of existential concerns (such as Perach & Wisman, 2019). In this inquiry, positive creativity will be explored by the ITE educators from its role in

stimulating a change of perspectives, and potentially behaviour, towards the local environment where the university is situated.

Several distinctive characteristics of creative individuals are outlined by creativity researchers. Daniels (2013) states, 'creative individuals tend to be open-minded, willing to consider possibilities, and able to tolerate ambiguity while contemplating an idea' (p. 11). Taylor and Gantz (1969) chose to describe five fundamental forms of creativity from creative individuals: *expressive spontaneity*; *productive skill*; *inventive ingenuity*; *innovative flexibility*; and *emergentive originality*. *Expressive spontaneity* is a spontaneous creative behaviour in which 'freedom to create without training may result in products that are creative when the person in question has a great deal of talent' (p. 6). When spontaneity is polished through training or education, creativity is further viewed as a *productive skill*. From the creative production, a person may advance further into *inventive ingenuity* when they exceed 'mere skill and can manipulate concrete elements in the environment inventively by discovering and combining environmental parts to solve problems' (p. 7). Suppose a person decides to deal with abstract concepts rather than concrete products? In that case they apply a higher form of creativity called *innovative flexibility* in which relevant variations, alterations, and adaptations of a unique idea take place for an independent creative outcome. A person's transaction of personal perception often leads to *emergentive originality,* which generates 'the most original ideas from which innovators derive their creations are maximally abstract and unapplied' (p. 7). These aspects of creative individuals provided by Daniels (2013) and Taylor and Gantz (1969) will inform my consideration of how my co-participants and PSTs view and discuss their creative traits.

Wallas' updated framework for stimulating fruitful creativity informs how this Critical Participatory Action Research (CPAR) should be designed. Sadler-Smith (2015) reinterprets Wallas' (1926) stages in the creative process into: (1) *preparation* (conscious work); (2) *incubation* (non-consciousness); (3) *intimation* (fringe consciousness); (4) *illumination* (focal consciousness); and (5) *verification* (conscious work) (Figure 3). *Preparation* is a stage where conscious efforts, usually through education, are employed to construct thought systems. A creative thinker then poses

problems in their conscious thoughts to allow the extension and enrichment of mental operations of subconscious thoughts within the *incubation* stage. The creative thoughts are now navigated into a promising direction, such as a creative outcome or creative intuition during the *intimation* stage. In the stage of *illumination*, the creative thinker is going through an elusive phenomenon that activates insight experience. The final stage of *verification* happens in a sociocultural domain in which gatekeepers (e.g., critics, peer reviewers, and teachers) curate the creative outcome according to tradition or social structures. Wallas' model offers a general architecture to situate relevant concepts and theories of creativity within my inquiry. In this instance, the model imbues my approach in designing, considering, and determining appropriate introductory workshop activities to be presented to my co-participants within this CPAR. Hence, the ITE educators experience their own creative processes (creative learning) before implementing their creative teaching, and teaching *for* creativity, in their classrooms.

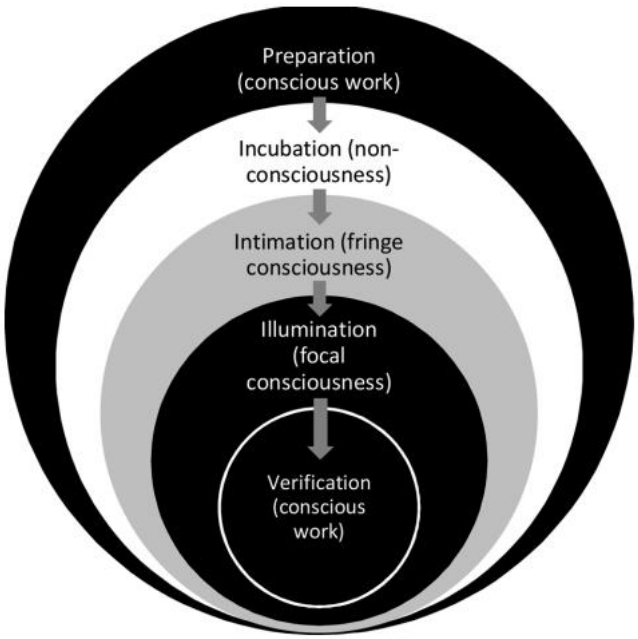


Figure 3 – Five stages of the creative process (Sadler-Smith, 2015)

Creativity is multifaceted and often viewed from various perspectives, one of which is the creative cognition approach. According to Ward (2007), the creative cognition paradigm uses a standpoint in which creative products are distinguished by their originality and practicality. Thus, Beaty et al. (2016) contend that the creative cognition

approach primarily focuses on constructing novel and useful ideas. From the lens of the creative cognition approach, a trajectory of dimensions of creativity that span from *Big-C* to *little-c* to *mini-c* to *Pro-c* to *proto-c* creativity (see Table 2). These multidimensional perspectives have assisted creativity researchers to understand distinct facets of creativity, antecedents' creative processes, and implications of creativity. I specify these dimensions, their concepts, and their relevant sources in Table 2. In my research, I contextualise creativity as everyday creativity, and further develop Lin's (2011) model of creative pedagogy from the sociocultural practice of my co-participants. I introduce other dimensions of creativity; however, I do not specifically encourage my co-participants to consider creativity about artistic activities.

Table 2 – A summary of various concept of creativity in the literature

Dimension of Creativity	Summary of Concepts	Relevant Sources
***Big-C* or eminent creativity**	Early research predominantly explores creative genius, creative works, and qualities of traits or intellects of genius	Stein (1987); Galton (1962); Jolly (2008); Simonton (2020); Sternberg et al. (2001)
***little-c* or everyday creativity**	Research focuses on creative endeavours performed by ordinary people	Stein (1987); Beaty et al. (2016); Bellass et al. (2018); Benedek et al. (2020); Grohman (2018); Lin (2011)
mini-c	The genesis of creative expression	Kaufman and Beghetto (2009)
***Pro-c* creativity or expertise creativity**	An inclusive concept where contributions from creative individuals who have not yet reached *Big-C* are appreciated	Kaufman et al. (2008); Kaufman and Beghetto (2009)
proto-c	Begins with research on animal cognition; a creative action that is built on reinterpretations of experience	Kaufman and Kaufman (2004); Patterson and Mann (2015)

Past studies of creativity are commonly nuanced by these categorisations; however, Runco (2014) considers these distinct academic vernaculars of less importance and suggests specific use of the adjective *creative* and a precise noun (e.g. *product*, *process*,

or *achievement*) for the educational practice of researching and enhancing creative potential. Runco's perspective has informed me in approaching the concept of creativity in its effective application for this study involving creative product, creative process, creative practice, and creative climate. As I engage in educational endeavours that aim to understand, yield, and develop creative capacities of educators and learners, my inquiry will place emphasis on terms such as creative pedagogy, creative classroom, creative product, and creative process, rather than concepts of *Big-C* or other dimensions that categorise creativity solely based on outcome. Applying this lens to the concept of creativity places an importance on introducing these terms to my co-participants during an introductory workshop.

Along with investigations into to the dimensions of creativity, there has also been considerable focus in creativity literature on distinctive normativity, which influences the conceptualisations of creativity in both Eastern and Western nations. Baker (2017) explains the term *normativity* as a shared subject matter that prescribes, recommends, or evaluates beliefs, attitudes, values, and virtues in a society, such as a system of morality, a system of etiquette, or the laws of states. In Western societies, according to Amabile (1983), creativity has been studied as a particular personality, as products, and as thought processes from controllable human cognitive mechanisms and testing. Despite emphasising creativity as cognition, Boden (2003) supports Kant (2000), who viewed creativity as a transcendental experience that emerges within contingency, and that creativity is acquired naturally and shared between self and other. These purviews suggest that Western cultures emphasise the processes and outcomes of creativity. However, these conceptions of creativity may not apply in Asian societies. Niu (2012), for example, describes creativity in Confucian societies (e.g., China, Hong Kong, Japan, South Korea, and Southeast Asian countries) as human focused, co-creative, contextual, novel, and appropriate. Another example is, while Western society often relates creativity to innovative generation, a traditional society like Bali offers a concept of creativity that goes beyond painting, dancing, and sculpture on a daily basis – to a fusion of traditional and modern art that enables amicable political dominance between the Indonesian central government and Balinese clans. Weiner (2000) describes:

> Indeed, a key inheritance of the Balinese is the successful transplantation of Indonesian Hindu culture from Java to the Isle of Bali in the face of Moslem

> conquerors in the fourteenth century. In other words, adapting traditional ways to changed circumstances is a Balinese tradition. And to some extent, every culture must develop the same ability, if it is to survive. (p. 170)

Paletz and Peng (2009) articulate that creativity researchers should not assume that creativity functions in the same way across cultures. According to Westwood and Low (2003), the conceptions of creativity from these two worlds are separate: either reinvention or product. Dewey (1938) argues that the problem of the *either-or* formulation is the absence of compromise, alternatives, or intermediate possibilities. Production is seen as a vital attainment during a linear sequence of the creative process from Western perspectives; it contrasts with the essence of 'cyclical, nonlinear, and enlightenment-oriented' creative process in the Eastern cultures, as described by Lubart et al. (2019, p. 426). Niu (2012) outlines that Western societies value deep analysis on cognitive abilities while Eastern societies appreciate reconnection with their ancestors or past insights. This difference has affected formal teaching and learning, as the Eastern communities aspire to feature the creativity of Western universities. Shaw (2016) illustrates that the concept of freedom in the Western view of creativity, which is a key component of making decisions, often clashes with Eastern countries' political and sociocultural circumstances, such as the censorship or restriction of information sources.

Normativity, according to Schwartz (2020), evolves 'in response to impediments encountered and to impulses to refine and improve practice' (p. 122). This mutable nature of normativity offers a space for Call's (2015) attempt to protect tradition and facilitate innovation in advancing the field of creativity for both worlds. While Niu (2012) characterises societies in Eastern countries as compliant, reserved, rigid, and traditionally focus on sharpening basic skills rather than creative potential, Gardner (1989) proposes to combine 'the accent on skills and the flair for creativity' to reduce friction between cultural markers and the progressive movement (p. 157). Shao et al. (2019) suggest establishing exposure to foreign cultures to broaden the conceptual boundaries constituted in ones' culture; thus, one could flee from limiting the array of one's cultural norms and begin reappropriation of varying ideas. These perspectives inform me on the importance of initially exploring the co-participants' views about

creativity, since they are influenced by their indigenous philosophies, before introducing Western concepts of creativity. This approach will allow the emergence of a creativity that is not disruptive to the ITE educators' cultural markers.

To bridge conceptions of creativity between the two worlds, especially for learning purposes, Treffinger et al. (2002) suggest considering four interdependent components, such as *characteristics*, *operations*, *context*, and *outcomes*. These components offer possibilities for understanding creative actions from micro levels of professionals, including their sociocultural factors. Lubart et al. (2019) explain that learning sociocultural elements is helpful in understanding 'how the meaning of creativity and its practice are constructed in local cultural settings' (p. 435). The emergence of a sociocultural approach considers culture as a fundamental part of creativity and supports creativity as a motor of cultural growth. Similarly, Glăveanu (2018) states it is substantial to stimulate *emic,* or local meanings and practices of creativity, in the domain of research and education rather than merely adopting theories or models from other geographical and cultural contexts. Treffinger et al. (2002) define the four components as follows:

> *Characteristics* include the personal characteristics as discussed above [cognitive abilities, personality traits, and past experiences]. *Operations* involve the strategies and techniques people employ to generate and analyse ideas, solve problems, make decisions, and manage their thinking. *Context* includes the culture, the climate, the situational dynamics such as communication and collaboration, and the physical environment in which one is operating. *Outcomes* are the products and ideas that result from people's efforts. (Treffinger et al., 2002, p. 10)

Another classic framework for researching creativity is Rhodes' (1961) four P's of creativity, which provides units of analysis, i.e. *person*, *process*, *press* (environment), and *products,* for creativity researchers (for example Hickey & Webster, 2001; Mandico & Higgins, 1997). Rhodes' framework has influenced much research, especially with art products perceived as crucial elements of the creative process (such as Busse et al., 1986; Runco & Johnson, 2002; Tan, 2001). Products, according to Rhodes' model, are often considered as outcomes of innovation; however, Barnett (2020) argues that innovation is not an adequate characterisation of creativity, where 'creativity implies an element of intentionality or will—the newness can't be merely a matter of complete

chance—but creativity is also an evaluative concept, since typically to speak of an action or a process as being creative is to confer a positive evaluation on the activity in question' (p. 7).

Barnett's proposition implies intrinsic motivation, which is a concept that has been further shaped by Amabile (1983). Amabile offered a different underpinning framework to understand one's creativity i.e., through investigation of domain-relevant skills, creativity-relevant skills, and task motivation (e.g. Hickey, 2001; Mai et al., 2015; Wang et al., 2019). Although Amabile's model contributes to the way we design assessment for creative products nowadays, according to Glăveanu (2015), it is still inadequate to inform creative process and context. An underlying problem of perceiving creativity as consisting of segmented and self-contained elements in both frameworks is the absence of 'experiential accounts of acts of creation', which present organism, context, and emotional quality as an entirety (p. 314). Hence, Glăveanu (2015) continues by advancing the four P's of creativity into five A's (*actor*, *audience*, *action*, *artefact*, and *affordances*) to facilitate 'more molecular perspectives that emphasise relationships and holistic transformations rather than separate elements and their permanence' (p. 312). Glăveanu (2013) details *actor* as personal attributes within a societal aspect; *action* as synchronised psychological and behavioural displays; *artefact* as production and evaluation perceived from cultural contexts; *audience* and *affordances* as linkages between creators and a social and material realm. This concept of creativity informs me in understanding that there is a co-agency between people and their environment, in which, according to Corazza and Glăveanu (2020), we can enable the discovery of new creative potential. This lens will assist me in discussing the dynamic between co-participants and a particular environment, such as the Creative Collegial Group (CCG) and a *subak* cultural landscape (SCL) site, lending specific contributions to the co-participants' creative pedagogies. Thus, my inquiry is potentially empirical evidence of physical environment as an instrumental factor in creativity that has long been overlooked in creativity research, as contended by Dul (2019).

In the next section I will discuss several possibilities offered by a pragmatic approach that could support the incorporation of the creativity concepts elaborated on above into an educational landscape.

Pragmatising the Creativity in Education: Rethinking Practicality in Complexity

While philosophy can help us discover truths about creativity, education (including the education context of this study) also needs a pragmatic approach to bring a feasible creativity into its educational practices. According to Schwartz (2020), pragmatism draws '*realities* that constrain and inform objective inquiry. They are the experiences we cannot resist, the experimental methods that have proven successful in organising, explaining, and predicting experience, and most importantly, the fund of beliefs we bring to the task' (p. 34). Biesta (2014) claims that pragmatism is an angle to understand an issue captured beyond the assumption of a dualistic worldview that is a 'move from the sphere of *certainty* to the sphere of *possibility*', particularly different meaningful possibilities for different areas of human interest (p. 44). According to Biesta (2009), a pragmatic judgement offers twenty-first century science a way to deal with specific matters of concern for specific aims and ends. Educational research that follows a pragmatist understanding offers 'a way of *un*-thinking certain false dichotomies, certain assumptions, certain traditional practices and ways of doing things, and in this it can open up new possibilities for thoughts' in our ever-evolving and unpredictable world of education (Biesta & Burbules, 2003, p. 114). Pragmatism helps me understand that this research, which is aimed at developing an innovative pedagogy, should proceed through trial and testing in real classrooms, with space for educators to discuss and exchange ideas and examine learning problems.

Drawing from Dewey's (1938; 2010) pragmatic inquiry, I problematise creativity as a construction that emerges based on relationships between actions and consequences related to teachers' interventions and manipulations in their creative classrooms – classrooms with possibilities and alternatives. This construction of a creative classroom includes what Stoller (2018) refers to as *creative products*, which are generated from a transactional construction and a sub-function of inquiry in the environment as a form of knowledge. The notion of a creative classroom has emerged in higher education, as

Stoller (2018) further explains, to complement the premise of knowledge with 'wider intuitive, empathetic, and creative capacities necessary to engage in meaningful action in our social and natural environments' or for a larger purpose (p. 454). Knowledge in modern education, as elaborated by Loomis and Rodriguez (2009), is merely viewed as 'sense perception, probable and subjective, coherence of beliefs or statements, and dependent on transient social or group conventions' (p. 164). As a result, modern education has attained the power to fulfil the demands of growth, but 'it has lost the capacity to encompass the fullness of reality and to guide human conduct and dispositions in to the moral and intellectual virtues' (Loomis & Rodriguez, 2009, p. 164). This critiques how contemporary education is ingrained in the industrial age and for the twenty-first century need capabilities – including creativity – more than knowledge of facts.

The enactment of a creative classroom in higher education programs has been long contested. From Lee et al.'s (2015) perspectives, higher educational institutions excel at generating 'compliant transmitters for knowledge maintenance, rather than pioneering leaders who are transformers for innovation' since the focus of teaching is on building receptive abilities that are believed to be the foundation of critical and creative abilities (p. 144). Similarly, MacLaren (2012) acknowledges that many contemporary higher education institutions do not conform to the majority of Amabile's prerequisites for creativity to grow – such as organisation-wide supports, psychological safety, recognition of the value of intrinsic motivation, sufficient time, autonomy, developmental feedback, and creativity goals. MacLaren further elaborates that, as universities are of the utmost importance in every nation's development of innovation and creativity, their policy of creativity should include a change in pedagogy and assessment:

> Significantly different forms of pedagogy and assessment, changed relations between student and teacher, the ability to dynamically reshape the learning journey, multiple trans-disciplinary perspectives and means of interlinking educational practice with social change, multi-modal means of sense-making, the production of new knowledge and artefacts (social, cultural and physical) and even a rediscovery of the joy of learning – are all largely unexplored by the recent 're-engineering' of curricular structures. (MacLaren, 2012, p. 168)

Jackson (2006) describes challenges in engaging higher education teachers with creativity. First, the production of new knowledge in higher education is widely perceived as 'an objective systematic activity rather than a creative activity that combines, in imaginative ways, objective and more intuitive forms of thinking' (p. 3). Hence, it is imperative to co-create a new understanding of creativity within distinctive disciplinary academic communities. Second, creative contributions from educators are rarely celebrated and acknowledged in higher education institutions as their creativity is mostly implicit. Third, the creativity of students in higher education is often impeded by outcome-based assessment tasks and criteria. Chen-Chung et al. (2016) also support this notion by arguing that 'the acquisition of the knowledge and assessment required in formal education may restrict the creative process' (p. 286). Thus, approaches to meaningful assessment may be considered when creativity becomes a focus (Bolden et al., 2020; Lucas et al., 2014). Fourth, many educators have a limited understanding of creative approaches to teaching, the meanings of creativity in their disciplines, and teaching for creativity. These factors become obstacles for them to 'translate the generic language and processes of creativity into their subject-specific contexts' (p. 4). Similarly, Philip (2018) claims that not all educators have self-confidence in their ability to plan and administer creative approaches to teaching, resulting from their limited knowledge. Fifth, many educators resist undertaking the additional work necessary to implement creative approaches, albeit they acknowledge the merit of creativity. The claims of Jackson (2006) and Philip (2018) inform me when considering conditions not encountered during my collaborative work with my co-participants.

While there is no one-size-fits-all approach, Banaji et al. (2010) contend that a creative classroom fixates on reciprocity between 'spirituality, knowledge, skills, creativity, teaching and learning' (p. 71) within a progressively administered and supervised curriculum. Beghetto (2019) further illustrates the dynamic nature of the creative classroom, such that opportunities and obstacles that lecturers and students encounter provide a significant step in capturing creativity in the higher education environments. Although, to perceive those dynamics, lecturers should embrace a 'moment to moment contingency' (p. 25) in which collaborative actions between lecturers and students might unexpectedly take a wild turn (Clapp, 2017). In other words, lecturers should

explore areas outside their comfort zones and accept uncertainties, just as Simonton (2019) views that 'creativity is enhanced when people are jarred out of normal, everyday thinking' (p. 475). Uncertainties also provide a space for curiosity to grow, which can be stimulated by designing learning activities to support students practising the habit of questioning (Clark et al., 2019; Lamnina & Chase, 2019; Reeve, 2016).

According to Runco (2017), creative performance and innovation from teachers can be encouraged by the assurance that the educational system is supportive, and through recognition of barriers in the classrooms that limit the impact of creativity. In relation to facilitating a creative climate during the introductory workshop, I considered Runco's (2017) recommendation and adopted strategies to organise activities that stimulate creative ideas. Within these activities, I also aimed to garner information about the university's support of creative education as well as challenges in maintaining creativity.

I am particularly interested in promoting the notion of creative climates within my co-participants' classrooms, which, according to Cole et al. (1999), has four characteristics, namely: (1) inclusive personal teacher-student relationship; (2) de-emphasis of assessment; (3) openness and freedom of choice; and (4) classroom activities that support creative growth. Creative climate is defined as a climate that is supported by flexible and warm teaching that enhances exploration and risk-taking, rather than rewards distribution, to nurture independent thought (Brooks & Holmes, 2014; Mumford & Gustafson, 1988; Radloff et al., 2019). Tosey (2006) also supports this notion by arguing that 'it is at this edge, where uncertainty, difference and risk-taking have more space to generate creative thinking and action, that the propensity for emergence is thought to be at its greatest' (p. 34). Similar to Mumford and Gustafson, Csikszentmihalyi and Wolfe (2014) contend that extrinsic rewards, such as grades and promises of conventional success, may not likely spark students' new thoughts. However, teachers often encounter contradictions when they value creativity, such as not providing adequate rewards for learners' intrinsic motivations, divergent thinking, independence, playfulness, and autonomy. Cunningham-Bryant (2019) also exemplifies that risk-taking enterprise is often one-sided: teachers enjoin students into the unknown

while teachers rarely take risks themselves. Hence, a safe environment which 'pushes teachers to test the boundaries of their conservatism' is necessary to stimulate risk-taking (Ponticell, 2003, p. 16). I considered these identifications of creative climate as important factors to observe in the ITE educators' classes.

Within the discussion of inviting and experiencing a creative climate in the classroom, engaging the principle of the 'aimless stroll' (dérive) and 're-interpretive cultural practices' (détournment) can broaden pedagogical practice (Hammond, 2017). Dérive uses purposeful wandering as an open-ended approach to thinking and organising to manoeuvre learning environments around creative discovery. Following dérive, one moves to détourne by examining pre-existing cultural works to assemble new meanings. Hammond (2017) articulates détourne as a micro-political act that opposes 'standards of ownership and control' (p. 79). Hammond's notion of dérive and détourne dislodges restrictive activities in the classroom, leaving pedagogical practices open to exploration and risks (Howard et al., 2018). Hence, I considered these approaches to exemplify how a creative climate, including creative micro-moments, could be promoted while collaborating with my co-participants in designing pedagogical practices.

Reimagining Creativity, Pedagogy and Teacher Education

Csikszentmihalyi and Wolfe (2014) outline that creativity and school are inimical due to the nature of knowledge transmission, in which knowledge is highly controlled by teachers through pedagogy and is to be replicated as closely as possible by students. Root-Bernstein and Root-Bernstein (2017) correspondingly state, 'educational systems must balance two conflicting goals: one is to transmit accumulated knowledge to students for future use; the other is to prepare students to create additional, new knowledge that the future will inevitably demand' (p. 144). As a consequence, 'pedagogy usually either takes students' interests for granted or ignores them altogether' (Csikszentmihalyi & Wolfe, 2014, p. 174). This circumstance has marginalised creativity in many ways, although 'creativity is inevitably the business of the education system, not only of the economy' (Craft, 2003, p. 115).

In Western countries like England, creativity in school curricula have been an immense interest of their governments. Through the Creativity, Culture, and Education initiative, known as Creative Partnerships by Qualifications and Curriculum Authority (2011), the English government aimed for 'creative thinkers' as the fundamental skill for primary and secondary school students. Lucas (2016) has attempted to encapsulate five core creative habits to support growing creative thinkers amid vague and daunting notions of creativity in secondary schools, such as *inquisitive*, *imaginative*, *persistent*, *collaborative*, and *disciplined*. Craft (2003, p. 115) argues that the initiative has faced challenges of practice, including how we can administer the curriculum to stimulate creativity.

According to Clarkson (2005), traits belonging to prominent creators associated with creativity can be taught to other individuals, for example tolerance of ambiguity, willingness to take risks, behavioural flexibility, emotional variability, and ability to absorb imagery. This premise has been advanced by Harris (2016), who outlines the top ten creativity skills and capacities to enable measurement and evaluation for secondary educational contexts (Table 3). I used this list to develop classroom observation sheets to help me examine the dimensions of creativity that are promoted in the co-participants' classrooms. Understanding these creative traits will provide a basis for expanding Lin's framework towards a more nuanced way forward in enhancing creativity at the university level. Generated from Harris' list, my observation sheets will be committed to positive and little-c (everyday) creativity as well as innovative creativity that is central for fostering thinking skills.

Table 3 – Top 10 Creativity Skills (Harris, 2016)

#	**Skill – capacity to be stimulated**
1	Curiosity – prompting and reinforcing curiosity and exploration in students
2	Collaboration – encouraging teamwork
3	Problem-posing/problem-solving – presenting well-defined problems to students
4	Divergent thinking – encouraging and evaluating students' divergent ideas
5	Motivation, confidence, and persistence – growing students' intrinsic motivation
6	Innovation – applying creativity to generate new products and ideas
7	Discipline/mastery – enhancing the mastery of domain-specific knowledge and skills
8	Risk-taking/mistake making – appreciating and not penalising productive risk-taking and mistake making to construct 'creative trust'
9	Synthesising – encouraging the capacity to make connections among unconnected 'frames of reference'
10	Critical thinking – stimulating critical thinking processes that can be assessed and valued

Tanggaard (2011) reported three factors that hinder teaching for creativity or creative teaching in schools. First, creativity is often perceived in a radical sense that aims for critique, changes of policy, and opposition, especially when aesthetic expressions are involved. Regarding this factor, it is imperative to implement creative practices that enable 'intellectual risk-taking' (Beghetto et al., 2020) yet do not break the normal codes of conduct within an educational institution. The second threat to creativity is universal testing, which creates grading between schools and becomes the branding and marketing of a school. This external demand affects teachers' decisions when applying creative teaching as they are required to measure learning outcomes at the end of their teaching. Third, teachers spend extended time to preparing and administering creative teaching or learning compared to the time needed to prepare for traditional methods of 'paper and pencil' teaching. The dilemma becomes bigger when teachers have a more significant number of students to facilitate productive learning. Ranjan and Gabora (2013) add other dilemmas that might arise when incorporating creativity into the classroom:

> When teachers do make efforts to encourage creativity, it is often the case that neither teacher nor students know what the expectations are. Moreover, students fear that they will be critically judged if they produce something in which they have invested at a personal level. (Ranjan & Gabora, 2013, p. 119)

It is essential to redevelop creativity in teacher education programs to reclaim creativity in schools (Bore, 2006). Harris (2017) describes how 'creativity training in teacher education is still an underdeveloped area, with a refocus on Science, Technology, English, and Maths (STEM) subjects lacking a creativity integration' (p. 49). Sternberg (2019) argues that a significant barrier to teaching for creativity is that teachers have limited knowledge on how to teach for creativity and limited access to sources to learn about creativity:

> They have not learned how to teach for creativity in their training, and the standardized tests given to students on the basis of which the teachers, not just the students, will be evaluated place no emphasis on creativity. If we want teachers to teach for creativity, we have to remove the barriers. We could start by teaching teachers how to teach for creativity. Then we could encourage rather than discourage creativity on standardized tests. (p. 101)

Questioning is an example of creative inquiry that can be acquired by PSTs during their teacher training program. Harris (2013) mentions four questioning characteristics to practise during pre-service training, such as pre-planning questions, avoiding a focus on quizzing, offering probing questions before deep discussion, and using specific questioning strategies (e.g., open questions, question stems, sentence starters, think time, planted questions, and envelope questions). Meanwhile, Willemsen et al. (2018) label open-ended questions as 'open invitations' to extend the sense of openness within classroom discussion. Willemsen et al. (2018) argue that teachers can modify open questions into topic-soliciting invitations by leaving all options available and offering students the authorship to start a topic for discussion. Regarding Willemsen et al.'s (2018) proposition, open invitations are a form of risk-taking that potentially generates more sustainable discussion in the classroom.

In contemporary higher education, a signature pedagogy, in which students are guided to perform like a practitioner, has been widely implemented to facilitate knowledge and ability development of a discipline (Jackson, 2020). However, Korthagen (2016) contends there is a limited impact on teaching in schools of this signature pedagogy in teacher education as it does not explicitly construct 'a view of teacher learning' and 'the view of the learning of the teacher educators needed to enact a certain pedagogy in their teacher education practices' (p. 312) let alone teaching creativity. Korthagen et al.

(2006) analysed three cross-country teacher training programs (The Netherlands, Canada, and Australia) to figure out principles of learning about teaching, the most important of which are: it involves a view of knowledge as a subject to be created rather than as a created subject; it demands a shift in focus from the curriculum to the learner; it is strengthened by (student) teacher research; it emphasises learning to teach by working closely with peers; and, it is stimulated when the teacher educators model in their own practice the teaching and learning approaches promoted in the program.

It is also important to evaluate the relationship between researchers and educators to accomplish a transformation of pedagogical practices in ITE programs. Beghetto (2009) highlights a gap within the creativity literature, where researchers pay little attention in working collaboratively with educators to collect, interfere, and substitute practices that inhibit creativity with practices that encourage creative ideation and expression. A creativity researcher is the bridge that connects educators with advancements of creativity literature, as Mullet et al.'s (2016) research finding suggest, where although educators cherish creativity, 'their conceptions of creativity are uninformed by the theory and research on creativity' (p. 9). This notion is supported by Jackson (2006), who contends that 'most higher education teachers are unfamiliar with the body of research into creativity and how creative-thinking techniques can be used to facilitate problem working' (p. 4). As a creativity researcher in this inquiry, I outline later in this thesis how I managed this gap by organising an introductory workshop on creative pedagogies for the co-participants, where exemplars of creative-thinking techniques were presented. Furthermore, although teachers acknowledge creativity researchers' characteristics of the creative learner, according to Hong et al. (2017), the teachers are still uncertain about what comprises creativity and of their capabilities to incorporate creativity into their classes. Hong et al. (2017) contend these factors are due to the little availability of professional development, materials, and guidelines for practical application of integrating creativity in the classroom. Creativity researchers may reduce the gap by establishing a partnership with ITE educators, as I will explore later in my research.

In responding to Korthagen et al.'s proposition for shifting ITE programs incorporation of creativity, I take Barnett's (2020) proposal into account. Barnett's idea of pedagogical creativity in higher education is built on the premise that it potentially redirects the focus of skills acquisition in higher education into a deep engagement with 'worthwhile forms of knowledge and understanding' (p. 12) – a pedagogy that encompasses the tacit dimension of knowing in explicit ways. I interpret Barnett's notion of pedagogy as an ideal ecosystem that: (1) demonstrates an equalised power relationship between ITE educators and PSTs (McKeown et al., 2015); (2) resembles Wenger's community of practice in which students and lecturers share a domain of interest and help each other to develop a shared practice (Fraser et al., 2017); (3) allows evaluation-free creative thinking practice in several diverse domains to maintain students' intrinsic motivation (Baer, 2013); (4) embraces ambiguity tolerance to develop symbolic competence or the ability to translate the ambiguous or abstract concept into tangible texts, namely productive, creative uncertainty, and doubt (Diane, 2017); and (5) scaffolds ITE educators' and PSTs' accommodative environmental learning through first-order learning to understand, adapt, and maintain environmental sustainability (Rickinson et al., 2009). I argue that Lin's creative pedagogy is a potential model to manifest Barnett's ideal ecosystem.

Lin's Framework of Creative Pedagogy

An increasing interest in creativity has generated diverse domains for the implementation of creative pedagogies, including its application across cultural contexts (Cremin, 2015). Research has reported that creative pedagogies bring positive transformation for language learning (Liao et al., 2018) and content learning in higher education, such as promoting learning and cognition, challenges for student learning, and real-world application (Robinson et al., 2018). Lin's (2011) triad model of creative pedagogy poses a valuable strategy to guide such application. The creative pedagogy framework, according to Lin (2011) could also be potentially investigated to bridge creativity with other learning aspects, especially in the context of comparing its theorisation and application from Western and Asian perspectives. In this section, I will discuss the possibility of using creative pedagogy framework for an advancement of environmental learning in higher education programs situated in an Asian context.

Creative pedagogies have been commonly implemented in schools. In changing from the lecture as the main form of teaching and learning in university, Lin's triad model of creative pedagogy (Figure 4) is noteworthy to attend to in offering an alternative interactive (and creative) model for teaching and learning. Instead of viewing 'pedagogy' as a specific method of teaching, Lin (2012, 2014) focuses on the interactions between 1) teachers' imaginative, dynamic, and innovative approaches in designing and teaching lessons (*creative teaching*); 2) teachers' approaches to developing learners' creative capacities, curiosity, and learning motivation (*teaching for creativity*); and 3) teachers' and learners' active and creative endeavours in their own learning (*creative learning*). The interplay of these three elements emphasises parallel practices by teachers and students to stimulate creative development. In this research into exploring Lin's creative pedagogies in a tertiary education environment, I will also include teachers' endeavours in creating supportive climate for enhancing creative abilities and qualities both for themselves and for the PSTs.

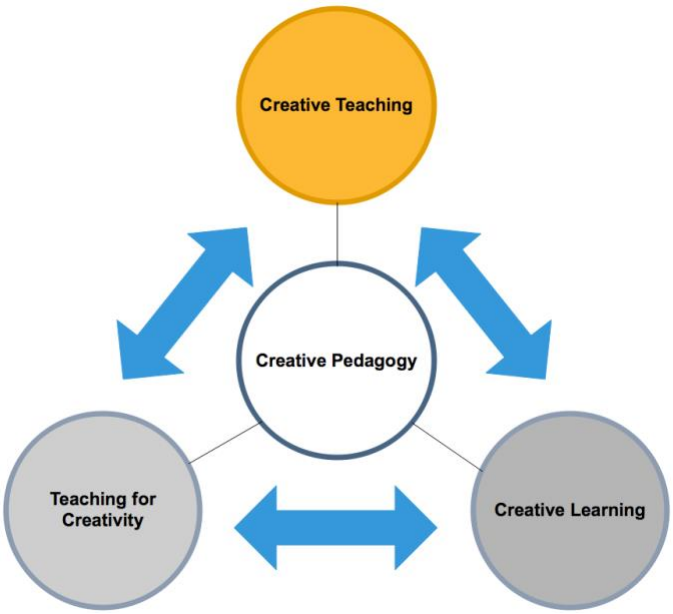


Figure 4 – Lin's (2011) creative pedagogy framework

The first element in Lin's framework, creative teaching, is teachers' imaginative, dynamic, and innovative approaches in designing and teaching lessons. Sale (2015) refers to creative teaching as 'the capability for creative weaving of methods, activities

and resources into high impact instructional strategies' (p. 135), for example, SHAPE (Stories, Humour, Activities, Presentation Style, and Examples) and divergent thinking exercises (Baer & Kaufman, 2012a; Barak, 2009; de Bruin, 2018; Zagonari, 2019). These two examples highlight creative teaching as flexible endeavours for educators and students to work on novel and useful features, often to a well-conceived lesson plan. It is thus important for educators to allow for extended class periods both for implementation and for students to build their confidence through observation of peers before deciding what creative products to create (Anderson, 2006). Besides extended class periods, Lin's creative teaching may require adjustment of classroom settings and timetables, such as moveable seating and adequate surface workspace (Harvey & Kenyon, 2013; Nyroos, 2008). Flexible and open design classrooms not only qualify movement within the physical space but also stimulate interactions among students and engagement between students and teacher (Rands & Gansemer-Topf, 2017). Furthermore, according to Deed et al. (2020) a flexible learning environment entails teacher agency to practice adaptation towards spatial affordances, such as personalisation of learning and fluid use of space. Besides an adjustment of spatial arrangement, Reinke (2018) adds that more available time, and often a change to the timetable, should be embraced to encourage intensive deep learning compared to surface learning approaches.

Creative learning, the second element in Lin's framework, in higher education is distinguished by activities that support students to work towards their 'authentic stances as a learner' (Barnett, 2020, p. 13), often occurring beyond the walls of the classroom (Beghetto, 2021). These activities can be facilitated by providing students with enough latitude to resolve problems and determine solutions or complete a creative product (Gomez, 2007; Ruggiero, 2017). Hence, in promoting creative learning, teachers are responsible for creating a responsive learning environment in which students can exercise their creativity. A presentation task, for example, can be transformed into a creative learning outlet where students showcase visually rich presentation slides with 'a task constraint' (Biskjaer et al., 2019; Stokes, 2005), such as a restricted number of words (Lucas & Rawlins, 2015; Richards, 2018). This challenge not only potentially provides context-specific stimulation for the students' creative capacities but also an

environment that encourages a culture of trust of their own learning processes (Ave et al., 2020; Richards, 2018). Also relevant to this study is where Morris (2020) argues that creative learning outcomes can be generated through the facilitation of a pragmatic, contextualised, and process-driven learning, such as self-directed learning, with four principal features: a context, a problem, a process of information seeking, and a solution that is tested against the problem in context. Zimmerman (1999) outlines self-regulation as 'self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals' and it entails adjustments resulting from feedback from prior performance (p. 14).

Jeffrey's (2006) description of key characteristics of creative teaching and learning are valuable to draw upon when exploring how these characteristics are presented in this research in my co-participants' creative pedagogy praxis. These key characteristics are: *relevance, ownership of knowledge, control of learning processes,* and *innovation* (Jeffrey, 2006). *Relevance* refers to teaching and learning that is meaningfully designed to suit the actual needs and interests of individuals and groups of students. Both creative teaching and learning need to promote an *ownership of knowledge,* to accommodate students' internalisation of knowledge and thereby contribute to transformation in understanding in the students. When students have *control of their learning processes* during creative learning they are self-motivated and not driven by extrinsic factors (rewards), leading to them knowing what they have learnt and what they want to learn (Greenwood, 2019). Creative teaching and learning enable changes, or *innovation,* to take place – for example students gain new knowledge, skills, perspectives, and understanding.

The third element of creative pedagogy, teaching for creativity, is related to maintaining students' creative capacities, curiosity, and learning motivation. Curiosity is defined by Loewenstein (1994) as an awareness that leads to the identification of unexpected gaps in learners' meaning-making processes. There are a number of strategies that can be adopted by teachers in respect to teaching for creativity. Stagg and Verde (2019) suggest ITE educators to risk going beyond learning biological facts to incorporate teaching scientific drawing as a creative skill to minimise the intimidating side of this

regular component of biology classes. Walker and Gleaves (2008) and Rust (2017) recommend the novel application of instructional media that concentrates on a digital narrative to encourage creativity movements, independence of thought, and comprehension of new concepts in higher education. For Lemon (2019) and Henriksen et al. (2020), the use of instructional media and digital spaces (e.g. social media) is a form of ITE educators' creative risk-taking since they challenge their own comfort zones with openness and curiosity, as higher education shifts towards blended learning.

In Lin's creative pedagogy framework, the concept of creativity is not considered as an 'attribute', which some people hold by their 'nature', rather a dynamic movement that is generated between teachers and students (Russell, 2015). Lin's framework supports to nurture creativity in ITE programs following Korthagen et al.'s (2006) principles and explicit demonstration of ITE educators' creative practice. We can commence these efforts by presenting space for professional development to ITE educators such as that provided by trialling creative pedagogies to boost their self-esteem and self-confidence, along with their ownership of the teaching and learning process (Craft; Craft & Jeffrey, 2015). Aligning with this notion of professional development, Lin's creative pedagogy framework helps nourish the ITE educators with 'sufficient space for their conscious and unconscious selves to find expression together' as it is essential to prepare them in turn to foster the creativity of pre-service teachers (Craft, 2015b, p. 95). Following Craft and Jeffrey's suggestions, my data collection started with an introductory workshop, which established a space for a small group of ITE educators to reflect and think through Lin's creative pedagogy framework.

Osborn (1953) states that 'creativity is so delicate a flower that praise tends to make it bloom, while discouragement often nips it in the bud' (p. 101). Osborn's metaphor implies that encouragement nourishes creative ideation, and an absence of appreciation cramps creative effort. This element of classroom learning will be considered in the enhancement of Lin's creative pedagogy framework in this research. Students' intrinsic motivation may likely flourish when teachers defer grading and encourage students to evaluate their own progress during creativity lessons, for example through warm-up activities (Grohman & Szmidt, 2013). Warm-up activities, such as brainwriting and

sketch storming, not only create a safe and supportive space, they also enable students to concentrate on the 'creative tasks' (Snyder, 2013) they are going to undertake during the lesson. For Baer and Kaufman (2012b), motivation can be maintained by regularly monitoring, evaluating, and adjusting the learning goals, the types of assessment, and the design of learning activities in the classroom. Student autonomous motivation can also be strengthened by providing a self-determination-based sequence of teaching (Assor, 2016) and peer learning (Guay et al., 2016; Lamey & Bristow, 2015; Loh & Teo, 2017). Other strategies that may assist students in evaluating their learning through a more complex thinking process are journal writing (Threlfall, 2014) and collaborative reflections (Clarà et al., 2019; Krutka et al., 2014). As blended learning becomes more popular, journal writing has been replaced by student ePortfolios combined with teachers' strong pedagogical approaches (Roberts et al., 2016). Many ePortfolios provide an anonymity and immediacy of delivery that enables students to deliver comments and questions during a reflection period without risking embarrassment, or reprimand. This can be achieved through the use of applications such as GoSoapBox (Carroll et al., 2018).

Another significant element to be aware of during the implementation of creative pedagogy is creative micromoments. Beghetto (2013) describes how creative micromoments emerge, surprisingly, when the prescribed curriculum meets the enacted curriculum that comes about through students' unexpected responses or ideas. Since creative micromoments are unscripted, unplanned, and new, according to Beghetto teachers must make an active decision – either to embrace the uncertainty and explore the unexpected ideas, or to navigate the class discussion back to the pre-planned lesson. In this respect, creativity becomes a product of successful communication processes (De Sousa, 2011). Beghetto suggests embracing collaboration between teachers and students in deciding how to progress, and whether the idea is appropriate in the context of the class discussion. Creative micromoments are opportunities for 'teachers to provide targeted feedback that, in turn, can help students' simultaneously deepen their subject matter understanding and develop their creative competence' (p. 137).

Before exploring how creative pedagogies can support the establishment of transformative environmental learning in ITE programs, I will discuss concepts of learning that inform investigation of this research.

The Tenets of Learning

The definition of learning often involves 'change'. According to the American Psychological Association (APA) (2021), learning is 'the acquisition of novel information, behaviours, or abilities after practice, observation, or other experiences, as evidenced by change in behaviour, knowledge, or brain function.' Similar to APA's concept of learning, Kolb (2015) identifies learning as transforming through experience. The notion of transformation, as Mezirow (2009) suggests, encompasses a process of generating change in a frame of reference that defines one's lifeworld. For this process to occur, learners should be facilitated to practise autonomous interpretation upon their personal experiences (Mezirow, 2009).

For the researcher who is interested in studying the concept of learning, Jarvis (2006) recommends they consider five elements: 'the person-in-the-world; the person experiencing the world; transforming the content of the experience; transforming the person experiencing the world; and the changed person in the world' (p. 13). In this section, I will explore the concept of learning following Jarvis' essential elements (transforming the content of the experience and transforming the person experiencing the world), which are relevant in relation to this inquiry, by drawing on a discussion about learning in the higher education context, learning for the environment, and traditional ways of learning in the Balinese community.

Transforming Learning Experience in Higher Education

Higher education institutions are 'practice landscapes' (Kemmis, 2022, p. 94) where learning happens as belonging, becoming, experience, and doing. According to Wenger's (1998) concept of the community of practice, higher education should provide a supportive learning climate for social configurations to enable identity transformation, meaningful experience, and mutual perspective sharing. In this inquiry,

I interpreted that the social configuration at a classroom level happens in multiple directions, between the teacher and students and among students, through pedagogy.

Watkins and Mortimore (1999) define pedagogy as 'any conscious activity by one person designed to enhance learning in another' (p. 17). With the broad definition of pedagogy provided by Watkins and Mortimore (1999), it allows an inclusion of assessment in this research, which according to William and Thompson (2008) receives little attention in the scholarly literature of pedagogy. From a sociologist's perspective, Durkheim places morality in the heart of pedagogy when he states that 'pedagogy is not the art of teaching; it is the *savoir faire* of the educator, the practical experience of the teacher' (Durkheim, 2011, p. 2). Durkheim also emphasises that learning and experiences are intertwined:

> If educational theory goes beyond its proper limits, if it pretends to supplant experience, to promulgate ready-made formulae that are then applied mechanically, it degenerates into dead matter. If, on the other hand, experience disregards pedagogical thinking, it in turn degenerates into blind routine or else is at the mercy of ill-informed or unsystematic thinking. (Durkheim, 2011, p. 2).

Transformation of learning experience is vital for creativity as 'experience provides fuel for ideation' (Osborn, 2012, p. 51). The merits of pedagogies to transform learning experiences can be seen in the literature, with much focus placed on arts-based pedagogy (e.g., McLaren & Arnold, 2016; Rousell et al., 2018; Ward, 2013), inclusive pedagogy (e.g., Florian & Beaton, 2018), and early childhood pedagogy (e.g., Figueiredo et al., 2018; Harris, 2015; Rintakorpi, 2016). Craft (2015a) summarises that those investigations on pedagogy are generally intended to enhance students' behavioural, cognitive, and emotional engagement, to overcome declining motivation and inadequately high achievement. In my inquiry, I sought to observe transformation of perspectives and praxis of ITE educators and PSTs as a result of pedagogical change. Purcell (2019) asserts teachers in higher education play a role in motivating their students to be receptive to the possibility of perspective change through dialogic engagement with their peers. Adult educators are the ones that have the potential to assist individuals in transforming their previous uncritically assimilated perspectives (Kroth & Cranton, 2014). Values, beliefs, assumptions, and preferences, which were constructed when individuals were younger, can be transformed by introducing

discrepant perspectives, such as role play, journals, debates, storytelling, and thought-provoking learning materials. To successfully adopt these strategies, adult educators need to consider students' dimensions of the world, such as social dynamics and cultural norms (Ryoo & Kekelis, 2018).

Merriam et al. (2012) highlight three key concepts of transformative learning in adults: experience, critical reflection, and development. Merriam et al.'s explorations build on the seminal theorising on transformational learning by Mezirow. Experience is integral to adult learning as it may add new viewpoints to our prior knowledge or trigger fundamental changes of our perspective. Merriam et al. suggests dimensions of experience that can be accommodated into higher education, such as vicarious experiences, simulated experiences, collaborative experiences, and introspective experiences. However, our cognitive processes also require critical reflection to generate effective learning. Merriam et al. (2012) state 'individual development is both inherent in, and an outcome of, the process. The ability to think critically, which is mandatory to effecting a transformation, is itself developmental; that is, we can become better, more critical thinkers' (p. 147). Constructing and re-constructing knowledge through experiences and critical reflections move adults to an awareness of personal development.

Transformative learning in higher education occurs beyond a change of *logos* (the realm of objectivity and logic), it also includes the change of *mythos* (a dimension of knowing in forms of symbols, narration, and mythology) (Dirkx, 1997). Transformative learning entails 'very personal and imaginative ways of knowing, grounded in a more intuitive and emotional sense of our experiences' or a soul dimension, which, according to Dirkx (1997), has received little attention in existing research on adult learning (p. 80). Similarly, Clark (1997) argues that *mythos* assist us in understanding the bigger picture of our experiences through a creative impulse or 'a flash of insight' known as 'Aha' (p. 14). From the perspective of neurobiology, Taylor (2001) discovers that a transformative process does not solely depend on critical reflection but also relies on exploration and resolution of emotions, in which emotions are indispensable for a reasoning process to take place. Additionally, Kroth and Cranton (2014) propose a

unified definition of transformative learning to accommodate both rationality and feelings, which guides me in designing this research:

> Transformative learning is a process by which individuals engage in the cognitive processes of critical reflection and self-reflection, intuitive and imaginative explorations of their psyche and spirituality, and developmental changes leading to a deep shift in perspective and habits of mind that are more open, permeable, discriminating, and better justified. Individual change may lead to social change, and social change may promote individual change. (Kroth & Cranton, 2014, p. 9)

With the increasing social responsibility of higher education, there is already the identification that individual change should be supported by a transformation of learning content that is directed into an agenda of social change. In a classroom context, Renee et al. (2020) exemplify that design thinking is potentially a social transformative means for creative and sustainability-related curriculum. Design thinking activities invite students to propose solutions towards environmental issues through five stages of active learning i.e., observe, define, ideate, prototype, and test. I built this insight into the activities I presented in the introductory workshop within this CPAR.

In the next section, I will discuss further the possibility of transforming learning content in the university by presenting environmental learning that allows students to experience nature and indigenous ways of knowing.

Transforming Learning Content in Higher Education Through Environmental Learning

The university experience has been disrupted in response to market demands – from changes of specific teaching elements by educators to the 'unbundling' of degrees into individual courses (Glyn, 2017). To deal with this complexity, universities are encouraged to innovate and experiment on their modes of instruction, learning content, and research. Barnett (2018) proposes a notion of an ecological university in which universities are suggested to actively seek possibilities for advancing the wellbeing of the world within their interconnected ecosystems (Figure 5). Morini (2020) describes Barnett's ecological university could be operated at three levels: curricular ('to include in all curricula and research training'), reflective (to construct 'a contextualization of academic work in time and place'), and prefigurative (to transform universities 'as the

root of our active relationship with our environment'). While competition is an important element in a healthy eco-social system for quality assurance, the notion of ecological university emphasises collaboration and collegiality as catalysts for change (Jackson, 2019).

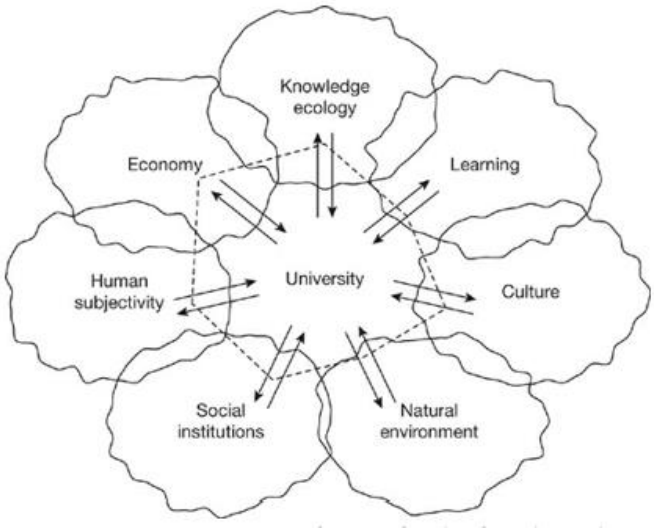


Figure 5 – Barnett's (2018) ecological university and its seven ecosystems

According to Barnett, the intersected ecosystems reflect responsibilities of universities in the twenty-first century to restore the socioecological systems of the world, called an ecosphere. This concept of an ecosystem implies 'a world of movement and change' and to achieve that, an ecological university should discover ways to work on different levels and move in multiple directions (p. 20). The ecological university emphasises an openness within itself and to the wider world, for example to advance its knowledge and learning ecology through self-awareness (Ellis & Goodyear, 2019). The ecological university is also in a strategic position to broaden its horizons and public understanding. An ecological university often initiates an expansion across its ecosystems or a boundary crossing, such as the knowledge, learning, and social institutions ecology when an ecological university decides to work on the possibilities for culture development within its institution. Barnett further highlights the ecological university as a creative player in the advancement of a community in this precarious world beyond cognitive capitalism, for instance through an enactment of experiential curriculum.

My research is an embryonic example of how five ecosystems (knowledge, learning, culture, persons, and natural environment) can be supported through a transformation of learning content in an Indonesian university setting. In this study, a small group of ITE educators and I worked together to infuse environmental learning into five different courses (units of teaching) with a closer look at Balinese ways of knowing. In this section, I will justify how environmental education and indigenous knowledge are potential learning content that bring differences to the development of the five ecosystems in the university.

An agenda into environmental education (EE) was first established in 1977 during the UNESCO Tsibilisi conference, with a primary focus on generating changes of human behaviour as individuals, groups, and society towards their natural, social, and cultural environments (Shephard et al., 2015; Sterling, 2001; Widdop Quinton, 2015). From a base in rural and local studies, EE further influenced the growing international parallel movements, such as education for sustainable development (ESD), education for sustainability (EfS), and sustainable education, offering multiple visions of resolving sustainability challenges (Sterling, 2001). While these global endeavours have explored educational interventions and the characteristics of school students (e.g., environmental knowledge and attitudes), Rickinson et al. (2009) suggest EE researchers should articulate how learning – 'as a process of change in the way we look upon the world' – is experienced by students (p. 14). In this inquiry, I engage with the term 'environmental learning' (EL) as it encompasses extensive dimensions of learning in relation to sustainability, as distinguished by Sterling (2001): learning about; learning for; and learning as sustainability. Scott and Gough (2003) provide the nature and scope of environmental learning:

> Learning which accrues or is derived from an engagement with the environment or environmental ideas and thus can be the outcome from formal or non-formal educational programmes in schools, and/or communities, from designated 'environmental education' or 'education for sustainable development' interventions or from personal or incidental learning where no teacher or instructor was involved. (Scott & Gough, 2003, p. 14)

EE is imperative because human beings gain a great significance in, and of, nature through the interpretation of nature's ambivalent signs, patterns, resources, and environmental properties, including crisis (Luke, 2001). Luke outlines that environmental educators play a vital role in helping 'to decode which signs are read, when they are scanned and how they are interpreted' as each human being will 'observe natural patterns differently, choose to accentuate some, while deciding to ignore others, nature's meanings always will be multiple and unfixed' (p. 187). Thus, the aim of EE is predominantly to develop a pro-environmental consciousness, which Kollmuss and Agyeman (2002) define as a complex capacity constituted by environmental knowledge, values, and attitudes that later likely develops into pro-environmental behaviour. Kurisu (2015) describes pro-environmental behaviour as behaviours that contribute to environmental conservation in physical (e.g., school, home, and workplace) or conceptual (e.g., public, personal, and community) places. Kurisu's perspective on pro-environmental behaviour demonstrates the importance of place in one's life, as also suggested by Shelton (2018) and Stokols (2018). Likewise, Orr (2013) mentions Raymond Dasmann's concept of 'biosphere people' when referring to the importance of place in education. According to Orr (2013), integrating place into education offers (1) growth of people's dimensions of intellect (e.g., direct observation, investigation, experimentation, and skill in knowledge application) through experience; (2) promotion of thought diversity, a wider understanding of interrelatedness, and a longer perception of time; (3) opportunities to re-educate people 'in the art of living well where they are' (p. 186); and, (4) space to position 'an applied ethical sense toward habitat' (p. 187).

A focus on learning outcomes is inevitable as educators have been continuously questioned about the success of environmental learning and, traditionally, assessment and evaluation are mandatory. For most environmental educators, an assessment of students' environmental perceptions, using the New Environmental Paradigm (NEP) as a starter, is useful to plan, implement, and evaluate environmental learning (Manoli et al., 2019). This instrument further assists environmental educators in considering adult students' cultural philosophy, which navigates risk perception towards climate change rather than education level (Xue et al., 2018). Although the NEP is available to specify students' environmental attitudes and concerns, determining progressive change in relation to the two entities is problematic since it requires a longitudinal commitment

from educators and institutions (Shephard, 2008). Considering this constraint, environmental learning in higher education should be viewed as an experience for students to provide meaningful contribution to their community, with utilisation of their attributes that are related to attitudes and behaviours instead of merely a learning accomplishment (Rickinson et al., 2009). As an example, environmental learning may turn out as a powerful tool for students to construct arguments 'to defend preferred positions of their cultural subgroups, even if those positions are at odds with the prevailing science' (Xue et al., 2018, p. 333). In this case, environmental educators should be able to decide their approaches to translating concerns about the environment into concrete actions while considering geographic space (Fiebelkorn & Menzel, 2019) and cultural worldviews of the learners, or even promoting their spirituality (Zhang & Wu, 2016).

Environmental learning in Indonesia is hard to locate within formal educational institutions as it is not a separate subject (Parker & Prabawa-Sear, 2020). Primary and secondary school teachers in the country might not be familiar with notions of environmental learning, EE, or ESD, although they have been practising them since 2006 through a nationwide eco-school program and competition designed by the Indonesian government and called *Adiwiyata* (Prabawa-Sear, 2018). However, since the reward of participating in the *Adiwiyata* is an increase of the school's rankings rather than increased environmental understanding, environmental education has been predominantly presented as sustainability-management activities with little educational value for shaping students' knowledge, behaviour, and perceptions (Parker et al., 2018; Prabawa-Sear, 2018). According to Parker and Prabawa-Sear (2020) aspects of pedagogy for environmental learning that need attention in the country are (1) the dominant practice of rote learning; (2) the deliverance of facts as a learning focus; (3) the gap between acquiring environmental awareness and knowledge and behaving pro-environmentally; and, (4) the spread of helplessness. Aligned with these identifications of an environmental learning position, Muhaimin et al.'s (2019) findings highlighted how Indonesian science teachers perceive the Technological Pedagogical Content Knowledge (TPACK) as a significant framework that supports their teaching of EE. TPACK is largely constructivist and adult-learning oriented, in that 'it provides conceptual clarity and gives a language to explain technology integration into the

teaching and learning processes' (Chai, 2019; Sheffield et al., 2015, p. 229). These various studies of environmental learning in Indonesian settings serve to underline the complexities that may evolve within this critical participatory action research (CPAR).

Within the distinctive parameters of Indonesia, alternative framings of participation in environmental education is necessary. McGuire (2015), who challenges the conceptualisation of pro-environmental behaviour as a set of discrete actions, suggests the focus be placed on building environmental self-identities within adult education. Strategies McGuire (2015) offers are (1) creating engagement with learners' social and personal identities, such as place, culture, and local environment; (2) connecting learners with those who are deemed 'significant others' in the community; and, (3) providing authentic experiences to each learner that establishes 'an *I* or *Me*-centric justification within an environmental frame' to help shape their environmental identity (p. 710). Aligned with this personalising view of environmental education, Tooth and Renshaw (2009) contend that the discussion about sustainability should become 'a practical and emotional reality in student's lives' (p. 96). It implies the need for a new social ecology in education that allows physical, emotional, and attentive reconnection with the natural world to shift thinking, values, and actions into eco-centric practices. Littledyke (2008) suggests demonstrating a sense of relationship with the environment explicitly as 'a love of, and respect for, nature with feelings of interconnectedness with living things that can lead to motivation to act from a sense of responsibility and concern for environmental protection' (p. 1). Pendleton-Jullian (2019) recommends to understand the 'interconnectedness of humanity and the natural world, theories, models, observations, and experiments related to landscape and environmental ecology' to discuss change and resiliency in a different way (p. 113). Similarly, Capra (2007) stated environmental learning should encompass 'relationships, connectedness, and context' (2007, p. 12), which is required to support eco-literacy. However, Ives et al. (2018) contend the notion of human–nature reconnections remains vague and speculative, hence they set a conceptual framework to help us understand it better:

> Human–nature connectedness is a multifaceted concept incorporating (1) material connections such as resource extraction and use; (2) experiential connections such as recreational activities in green environments; (3) cognitive connections such as knowledge, beliefs, and attitudes; (4) emotional attachments

> and affective responses; and (5) philosophical perspectives on humanity's relationship to the natural world. (Ives et al., 2018, p. 1389)

In respect to Ives et al.'s concept of human–nature connectedness, educators may provide interventions at 'deep leverage points' to 'connect people to nature emotionally and philosophically' (p. 1394), such as infusing arts to construct meaning through visceral experience (Thomsen, 2015), incorporating spirituality and religion to re-instil learners towards nature (Hitzhusen & Tucker, 2013), and implementing mindfulness (Howell et al., 2011). Klaniecki et al. (2018) advances Ives et al.'s practical strategies to bring the concept of human–nature connectedness into place by defining the scale and scope of environmental issues, which includes specifying a geographic location, to implement interventions, identify available resources, and determine at what spatial scale educators are aiming to build connectedness. These insights contribute to my understanding about how environmental learning can be better enacted to stimulate learners' participation.

Summers et al. (2005) contend that the teaching of sustainable development should position student teachers to experience concepts, evidence, controversy, and values in non-segregated ways within interdisciplinary pedagogical initiatives. It is closely related to the integration of science, technology, society, and environment (STSE), to shift the focus of traditional science from knowledge transmission of an academic science context, to knowledge construction of students within their meaningful social-technological contexts, as proposed by Aikenhead (1992). According to Hedge and MacKenzie (2016), interdisciplinary learning also assists to develop students' understanding through conceptual schema and various techniques of reasoning, judging, and assessing, from learning with peers, alone and across disciplines.

In the domain of science learning, teachers often include socioscientific issues for students to resolve. Sadler (2004) defines socioscientific issues as social and scientific issues that are 'complex, open-ended, often contentious dilemmas, with no definitive answers' to induce informal reasonings constructed from multiple perspectives, such as societal norms and values (p. 514). While suggesting the introduction of decision-making strategies in addressing socioscientific issues, Gresch et al. (2017) further

recommends ITE educators in STSE education enhance pre-service teachers' capacities for thoughtful decision making through a combination of self-regulated learning and critical reflections. According to Gresch et al. these approaches work best in small groups as socioscientific issues often require evaluation of multiple arguments for one consensus. In addition to socioscientific issues, and for environmental education to succeed, Malandrakis (2018) recommends inquiry-oriented teaching to be adopted in ITE programs to stimulate PSTs' self-efficacy and confidence while engaging them in scientific approaches that lead to an understanding of the natural world. These approaches are described by Wenger (1998) as *imagination,* which enables students to construct images of the world and discover connections through time and space by making inferences from cases and inquiries they experience.

Goralnik and Nelson (2017) propose the inclusion of environmental valuation (e.g., natural law, traditional ecological knowledge, and spiritual ethics) into place-based education to encourage the application of environmental ethics, or 'ethical decision-making in the development of non-hierarchical relationships with the world' (p. 690). However, considering the various learning goals and motivations of adult learners, Heimlich and Horr (2010) suggest instead the incorporation of free-choice environmental learning into locally situated education, as it answers the individual's need for 'what information is taken in, filtered, framed, and applied as meaningful' to accommodate their personal environmental learning (p. 58). In Singapore, an intervention program called Transformative Education for Climate Change (TrEC) represents free-setting environmental learning, supported by a forum of educators, as a safe venue to clarify or inquire about climate change information for active engagement of pro-environmental behaviour (Wi & Chang, 2019). Wang et al. (2016) state that 'through experiencing a sense of choice in learning, a sense of competence as well as a sense of connectedness, learners feel self-determined (autonomous) and motivated' (p. 227).

These various recommendations from environmental education scholars informed me in designing the introductory workshop on environmental learning so that it would match my co-participants' practices and localities. I chose Critical Participatory Action

Research (CPAR) to be my research design, as Rickinson et al. (2009) highlight that research approaches are priority areas for stronger collaboration between researchers and practitioners rather than research topics. My research discusses nature and the dynamics of learning happening between ITE educators and PSTs in responding to Rickinson et al.'s note on emotional complexities of implementing university-based environmental learning, as stated below:

> Perhaps the most important implication is the need for environmental education practitioners to be sensitive to the potential challenges and complexities of environmental learning situations. This is about recognising the ways in which: (i) environmental learning can be difficult for learners; (ii) environmental learning experiences can vary between learners; and (iii) environmental learning can involve tensions between students and teachers. (Rickinson et al., 2009, p. 101)

Amidst the complexities mentioned by Rickinson et al., environmental learning provides opportunities to promote indigenous ways of knowing by transforming the learning content and experiences in higher education. In the next section, I will explore Balinese indigenous knowledge, which can potentially elevate environmental learning situated in an Indonesian ITE program.

Indigenous Knowledge and Practice

While *nak mula keto* (it was ever thus) may stop others from questioning Balinese indigenous knowledge and practice, this wisdom has only served to increase curiosity and wonder within myself. During my teenage years, I observed the absence of an air-conditioner in my grandparents' home, and further still the absence of a *need* for an air-conditioner. I wondered if there was a significant contribution played by their Balinese-style architecture in circulating the air, thus creating a cool environment in the house. I started a formal investigation into this phenomenon by connecting with an elder – an architect and a lecturer at a public university – to explore this topic and join a research paper competition. From this experience, I not only learnt that considered placement of physical bricks and empty space can significantly impact the temperature fluctuations and ventilation of a home, but also that bricks of knowledge could be constructed beyond the four walls of a classroom. Lindholm (2018) contends that 'science is built on significant amounts of knowledge and indisputable facts, but facts do not necessarily

rest on scientific thinking' (p. 993). Lindholm's theories signalled that traditional knowledge construction is still valid despite not being yielded from a scientific approach. In this section of my literature review, I will demonstrate how my *gebogan* stacks on the indigenous Balinese ways of knowing and practice can provide a strong foundation for the next stacks, building on a layer of transforming environmental learning in an ITE program.

Understanding the Balinese Cosmology

Western scientific thinking is a relatively new phenomenon, distributed through colonisation and globalisation, which later created dichotomies of the Western and non-Western (indigenous) world (Merriam & Kim, 2008). For the last few hundred years, Western perspectives have influenced our systems of thought to ignore indigenous worldviews:

> Anchored in classical Greek thought, the dominance of Western knowledge has resulted in nonattention to, if not outright dismissal of, other systems, cosmologies, and understandings about learning and knowing. Only recently have we witnessed a growing interest in learning as an embodied, spiritual, or narrative phenomenon. (Merriam & Kim, 2008, p. 72)

Indigenous people generate traditional knowledge from the observation of complex natural phenomena, tied to local culture and primarily a philosophy, with a global vantage point (Iaccarino, 2003). According to Althaus (2020), we need to embrace indigenous ways of knowing and being. They offer a potential source of actions and a reflection of distinctive values diverging from Western scientific epistemology, which can invigorate community engagement. Merriam and Bierema (2013) highlight indigenous perspectives of learning and knowing as communal, lifelong and informal, and holistic. Indigenous learning is characterised as communal, where knowledge is developed collectively based on the interrelationships and interdependency of community members for the benefits of the whole community (e.g., Caneva et al., 2017; Creese, 2019; Sujarwo et al., 2019). Their learning is situated within non-formalised and non-teacher-centred environments, and grounded in communal ethics, such as traditional or indigenous principles and philosophies of life. The indigenous communities actively seek holistic learning, which encompasses other ways of knowing (e.g., somatic, spiritual, emotional, moral, experiential, and social learning). Hence,

within these communities, learning is a lifelong practice of balancing the 'spiritual, emotional, physical, and mental to achieve whole personhood' (p. 244). For example, Ashok and Thimmappa (2006) describe Hinduism's way of knowing and living as taking a holistic approach in which people aspire to understand the intricate relationships between individuals, organisations, society, the universe, and the cosmos.

Bali is traditional society that has been predominantly influenced by Hindu's way of knowing and living, where the overarching concept of 'consciousness' forms a primary identity, which informs the framework of their environmental context (Hornbacher, 2013, 2021). Balinese commonly follow the disciplines of *Saivasiddhanta* and Buddhist philosophy, where they foreground their being and becoming on 'the liberation of the mind through awareness of the constraints imposed on it by the fact of being embodied in the material world' (Lansing, 2006, p. 2). *Tattwa Jnana*, a Balinese Hindu ancient scripture that teaches the importance of becoming a whole being, mentions that the union of the elements of 'consciousness' (*cetana*/*Siwa Tattwa*/*purusa*/archetypal man) and 'unconsciousness' (*acetana*/*Maya Tattwa*/*pradana*/archetypal woman) has created cosmology (Campion, 2012b; Sena, 2019). Both consciousness and unconsciousness are considered as the core tenet of an extraordinary creation; they are inseparable and thus the two can be balanced.

A traditional Balinese worldview believes the vast cosmos underpins two levels: micro-cosmos (human/*bhuana alit*/small realm) and macro-cosmos (universe/*bhuana agung*/big realm). In the creation process of the micro-cosmos, *purusa* derives *citta* (consciousness; cosmic intelligence) while *purusa* also merges with *pradana* to form *Tri Guna*, three interplaying qualities of beings, namely *tamas* (a state of darkness and materiality), *rajas* (a state of change and attachment), and *sattva* (a state of harmony) (Sena, 2019). *Purusa*, *pradana*, *citta* and *Tri Guna* amalgamate *buddhi* (higher intelligence), which later develops into *ahamkara* (ego; I maker). *Ahamkara* propels existence as it creates senses of sound, touch, sight, taste, and smell. These five senses build *Panca Maha Bhuta*, elements of macro-cosmos, within the human, namely *akasa* (ether), *bayu* (air), *teja* (light), *apah* (liquid), and *pertiwi* (solid). Micro-cosmos perpetually intertwines with macro-cosmos. Micro-cosmos resides in the macro-

cosmos. Elements of macro-cosmos, *Panca Maha Bhuta*, manifests micro-cosmos. Figure 6 illustrates these elements of micro-cosmos.

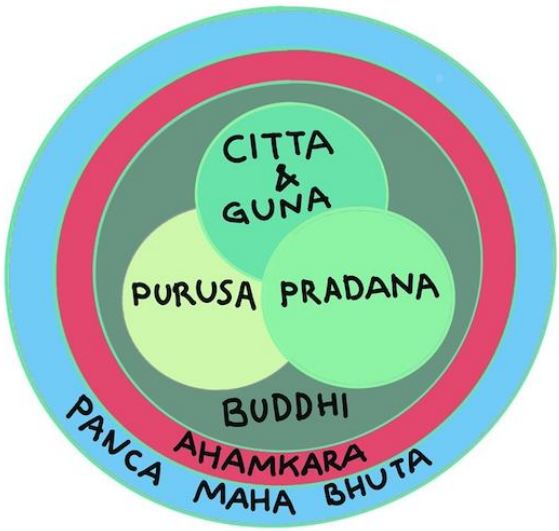


Figure 6 – Elements of Balinese conceptualisation of the human micro-cosmos – made up of the intersecting consciousness and intelligence states (buddhi), ego (ahamkara), and sensed materiality (Panca Maha Bhuta)

In a pre-modern society, cosmology encompasses a native outlook on the origin of the universe that helps human beings understand their position in nature, and learn from the past to manage the present and predict the future (Campion, 2012a). The Hindu cosmos is regulated by *samsara* (continuous flow), supported by *dharma* (truth), and affected by *karma* (the sums of one's past and present actions) (Campion, 2012b). *Samsara* is a continuous process of 'individual souls passing through successive incarnation' (Campion, 2012b, p. 112). To reach *samsara,* one should and must walk in the *dharma* ethical path of values, life circumstances, spiritual conditions, and purpose. Hindu cosmos also acknowledges *karma* as unavoidable effects of one's past and present actions, which are lived through *dharma* and *samsara.* The cosmos is created, maintained, and renewed for eternity.

Three elements of micro-cosmos, namely *citta*, *buddhi*, and *ahamkara* constitute *Tri Antakarana*. *Tri Antakarana* refers to three inner consciences, which construe a sharp thinker. *Tri Antakarana* illustrates that the act of balancing consciousness distinguishes our continuous development of cognition (Ram-Prasad, 2001). This philosophy

highlights the lifelong process of evolvement and learning and places importance on having balanced mind functions (Thapalyal, 2018). *Tri Antakarana* further clarifies that every individual is a bearer of consciousness with a mind with hierarchical functions designated as *citta, buddhi,* and *ahamkara*. *Citta* is translated as 'mind and heart, *buddhi* as 'higher cognition', and *ahamkara* as 'the principle of individuality' (Dalal, 2010; Werner, 2017).

Manah is an independent intermediary function in our cognition (*citta*), which bridges our sense organs and the outer world, to process the sense of perception and scriptural knowledge (Kobayashi, 2010; Soni, 2020). *Manah* in the learning context is the processing mind that needs stimulation, in the form of cognitive input, before learners can move forward to the following mind functions, such as analysing to determine actions (*buddhi*). The nature of *manah* is to question and doubt. It is responsible for carrying out the thinking process, yet it does not determine. The notion of *manah* is probably equivalent to Bloom's taxonomy lower-order thinking skills in the Western perspective. Lower-order thinking skills – remembering, understanding, and applying – entail less cognitive processing than high-order thinking skills (Adams, 2015). These mental processes usually involve memorisation, interpretation, and execution of concepts, respectively (Eber & Parker, 2007).

Buddhi transcends its origin (consciousness) into awareness. It is a faculty of mind that makes a final judgment about an object after discriminating and differentiating its qualities and faults (Soni, 2020). *Buddhi* is translated as 'being awake', which implies the involvement of the affective and cognitive features of the individual's mind (Fitzgerald, 2017b, p. 681). It can activate (re-)interpretations, plans formulation for the future, and change our predisposition (Fitzgerald, 2017a).

Ahamkara refers to 'ego' or 'self'. It determines one's attraction towards external objects and experiences, which ignites either pride or discontentment (Paranjpe, 2010; Ramaprasad, 2013). Ego processes these experiences to fabricate self-representation or a sense of identity. West (2008) elucidates:

> It is, surely, the ego's task to integrate the disparate self-representations so that 'I' can come to know who 'I am'; that is, to draw together and to make sense of

> the everyday self; the different, personal qualities, feelings and moods; the autobiographical memories; as well as making sense of the more numinous and spiritual experiences, derived from 'not-I' experience, without identifying with them and allowing the individual to unrealistically think of themselves as omnipotent, impotent, a demon, a prophet, a god or whatever. (West, 2008, p. 371)

The Balinese cosmology reflects De Souza's (2016) opinion on making meaning with our spiritual mind entailing a series of processes, such as perceiving facts through senses, generating thoughts within the conscious and non-conscious mind, triggering feelings which spring from memories stored beyond the conscious, and initiating gut responses or intuition, value judgments, and views. The interplay of the processes is an integral part of learning that enables individuals to become acquainted with their inner and outer world. In other words, spirituality presented within the Balinese cosmology facilitates the embodiment of the holistic nature of learning, in which equal emphasis is placed on cognitive, affective and conative aspects. Venkatesan (2014) believes those who actively commit to a whole concept of cosmology are more continuously driven at 'self-cultivation and normative ways of being in the world' (p. 78).

I am particularly drawn to the concept of incorporating spirituality from my Balinese background into education as it emphasises self-transformation and the way of being in the world by establishing a sense of interconnectedness and interdependence 'of self to other people, to the natural world and environment, and to the universe' (De Souza & Watson, 2016, p. 346). Similarly, Gearon (1997) posited that the interest in incorporating ecological issues into the spiritual landscape was now a collective consciousness of the global faith community. Integrating spirituality into education nourishes 'a feeling of acceptance, compassion and respect for all beings', which influences decision-making and potentially stimulates creativity, intuition, and a strong correspondence with nature (De Souza & Watson, 2016, p. 336). Bone (2016) maintains that we need to consider spirituality in advancing the environmental movement, creating connections to the sacred and appreciating the awe and wonder of nature. She emphasises that spirituality constitutes ethical practices that can grow awareness and support mindfulness towards the environment for people, especially those who live in cities and have limited opportunity to experience and connect with nature. However, De

Souza and Watson mention one limitation of implementing this approach in the current outcome-based education system is that 'classroom practitioners may feel unequal to the task of articulating and assessing affective and spiritual learning outcomes' (p. 133). During the introductory workshop within this CPAR, I aimed to work with a small group of ITE educators to explore and reconnect with their indigenous ways of living and knowing, including their spirituality.

Environmental Learning and Creative Pedagogies: From a Silent to Supportive Partnership

Creativity is posed as a way to resolve environmental crises, and environmental sustainability as a framework within which to be creative (Stables, 2009). However, Stables (2009) states that 'the development of creativity and addressing environmental sustainability within educational contexts has been one of silent partners—where the priority for one has muted the other, either explicitly or by default' (p. 200). In establishing a supportive partnership between creativity and environmental sustainability Stables (2009) recommends the incorporation of a holistic approach that engages a broad frame of ecological issues and tools. In my research, I draw on the creative pedagogy framework developed by Lin (2011) to inaugurate the aforementioned partnership, particularly in transforming learning experience and content in Initial Teacher Education (ITE) programs. Creative pedagogies can be adopted to create a new learning partnership between ITE educators and PSTs, which revitalises the ITE educators' roles as facilitator and activator. According to Fullan and Langworthy (2014) this form of learning partnership is an entry point into deep learning as it encourages the PSTs to define and accomplish their own learning goals while simultaneously being assisted to resolve demanding processes of learning by the ITE educators. A creative pedagogy framework recognises the social context of learning, and it prioritises involvement and connection that, according to Brockbank and McGill (2007), stimulates 'the creativity of constructed knowledge thereby encouraging movement towards higher stages of learning' (p. 208).

The notion of integrating creative practice and environmental learning has been successfully implemented by environmental educators. Environmental art (eco-art)

education is an emerging area of inquiry that re-connects learners with nature. Inwood (2013), for instance, collaborated with teacher-researchers promoting ecological concepts (e.g., sense of place, ecosystems thinking, and human impacts) through eco-art lessons with a heavily nature-centric approach to learning: learning *in*, *about*, and *for* the environment. Another environmental educator, Rousell et al. (2018), engaged environmental connectedness with creative experimentation by enacting a 'pedagogy toward more-than-human processes that cut across bodies, environments, materials, concepts, surfaces, feeling, sensations, and ideas', which they call *a/r/tography* (p. 3). *A/r/tography* involves cartographic practices of learning through mapping and recording, for example by drawing in the sand with sticks and creating six-word memoirs while photographing. Rousell et al. claims that, under fixed sets of protocols, this type of *a/r/tography* offers experimental, experiential, and productive learning processes that contribute to creative thinking and conversation. These examples demonstrate the possibilities of a creative pedagogy framework that supports environmental learning.

Creative thinking entails 'a fluency factor' (the ability to produce many ideas) and 'a flexibility factor' (the ability to shift easily between different kinds of thinking) (Meyer et al., 2013). Considering these characteristics, creative teaching within higher education often situates learning where students are engaged in higher-order thinking (e.g., autonomous thinking, exploration, and creative dispositions) while actualising possible pro-environmental behaviour. According to Campbell (2018, p. 7), it is necessary for ITE educators to create a learning environment where they can 'research, develop and create their own practice in unique, personal ways' to open the opportunity for them to become the agents of social and educational change. From the lens of transformative environmental learning, ITE educators are 'activists who work toward freer participation in discourse and democracy' by organising context (Taylor & Cranton, 2013, p. 41). In doing so, Blake et al. (2013) argued that ITE educators need to understand that transformative environmental learning is not an acquired skill, but rather a fundamental change of a whole person; and for that pre-service teachers may encounter an inconvenient circumstance where their beliefs and assumptions are challenged. In that sense, creative pedagogy offers a 'third space' or a dialogical circle

on values and ways of teaching and learning, which facilitates discussion about enjoyment and barriers experienced in the classroom, since cognitive activity alone is not always adequate to raise the inner power for transformative action (Lin, 2010; Loughlin, 1996). Creative pedagogy also potentially advances learning ecology as it is 'relational' (connects people, places, and other species), 'critical' (opens to criticism and questions), 'actional' (offers spaces for agency and change-making), 'ethical' (provides opportunities to examine ethical considerations and moral dilemmas), and 'political' (transgressive) (Wals, 2019). Building on these insights, my intention here is to explore the possibilities of engaging environmental learning with creative pedagogies to transform the learning experience and content in ITE programs.

Chapter Summary

In this chapter, I discussed my *gebogan* through the stacks of literature: wonderings about creativity; the tenets of learning; indigenous knowledge; and creative pedagogies for environmental learning. In this way, I have justified that the transformation of learning experiences and content in higher education can be achieved by incorporating Lin's (2011) framework of creative pedagogy (creative teaching, teaching for creativity, and creative learning) into environmental learning. Dewey's (1938; 2010) pragmatic inquiry will overlay my approach when designing creative pedagogies experience for my co-participants. To assist in the task of re-envisioning environmental education in ITE programs, Sterling's (2001) concept of sustainable education, Rickinson et al.'s (2009) notion of environmental learning, and Jarvis' (2006) description of learning will provide a type of scaffold. The transformation in both aspects of learning (creativity and environmental knowing) provide possibilities for Barnett's (2018) concept of ecological university to become visible in the ITE program where this research took place. I also offered another point of consideration to connect five of Barnett's (2018) ecosystems (knowledge, learning, persons, culture, and natural environment ecosystem) within the university by reintroducing an indigenous way of knowing. Having considered the literature that is key to this study, in the next chapter I outline the methodological dimensions of this inquiry.

CHAPTER 3: METHODOLOGY

Metaphorical Concepts that Guide this Chapter

sampat lidi
Palm leaf broom

Sampat lidi is a Balinese broom made from the spines of palm leaf. Apart from its practical function as a sweeping tool, *sampat lidi* represents spiritual metaphors in both indigenous and non-indigenous views. An indigenous Balinese way of protecting the whole family from dangerous or evil forces is *sampat dadi sungga*, where the sweeping ends of the broom are placed upside down in each bedroom. *Sampat lidi* is also used to illustrate the unity of diversity across the archipelago of Indonesia. In this chapter, *sampat lidi* is a metaphor that represents a complex unity of diverse elements in methodological dimensions building my research. Each section in this chapter represents the *lidi* (various spines), which eventually gather together to form the *sampat lidi*: a comprehensive and overarching account of methodological approach to support this research in exploring the establishment of environmental learning in an Indonesian initial teacher education (ITE) program.

In this chapter I describe interpretivist and transformative paradigms as the methodological foundations of my study. I justify the position of pedagogy in my research then provide an account of action research before describing critical participatory action research as my research design. I detail the processes of gathering qualitative forms of data in my research, covering an introduction to my data gathering activities, field entry, research phases, ethical procedures, and a discussion of issues experienced during the gathering of data. Finally, I elaborate on the steps that I undertook to analyse the data, including two cycles of coding, a conceptually clustered matrix design, and findings confirmation.

Methodological Positioning

There are two types of *lidi* commonly used for making *sampat*, namely *lidin nyuh* and *lidin ental*. *Lidin nyuh,* the central spines of a coconut leaf, are stiff. Thus, *lidin nyuh* are suitable bundles for a hard *sampat lidi* that is to be used to accomplish rougher tasks, like sweeping dirt from a home yard. On the other hand, *lidin ental,* the central spines of a sugar palm leaf, are more flexible. They make perfect bundles for a soft *sampat lidi*, which is commonly used by the Balinese people to sweep cobwebs from the walls of their shrines. I prefer to tie together *lidin nyuh* (as outer bundles) and *lidin ental* (as inner bundles) for creating an effective and long-lasting *sampat lidi*.

Choosing a paradigm for this research is like choosing an appropriate source of *lidi* for my *sampat*. It is essential that I describe each philosophical foundation of the research methodology before locating this research. Only then will I be able to justify how aspects of interpretivist and transformative research paradigms are appropriate to position my research and achieve my research objectives. This positioning is just like my blended *sampat lidi*: simultaneously flexible enough to catch the light dust and stiff enough to sustain a firm sweeping.

Introduction to Paradigms

Paradigms, or worldviews, guide researchers in understanding the nature of their studies (Morgan, 2007). Various worldview propositions have emerged in the landscape of social scientific inquiry. Denzin and Lincoln (2011) mention four major overarching interpretive paradigms guiding qualitative research: positivist/post-positivist, constructivist, critical (Marxist, emancipatory), and feminist-poststructural. Spencer et al. (2014) elaborate five philosophical approaches: post-positivism (grounded theory), social constructionism (symbolic interactionism and phenomenology), critical theory (participatory action research), feminist theories, and queer theory. Lincoln et al. (2011) update their positions into five paradigms, namely positivism, post-positivism, critical theories, constructivism or interpretivist, and participatory (+postmodern). On the other hand, Mertens (2009, 2015) and Creswell (2014) describe four philosophical worldviews that influence the practice of research: post-positivist, constructivist, transformative, and pragmatic. For this research project I have also considered the five

paradigm distinctions proposed by Ling and Ling (2017), namely positivist, neo-positivist, interpretivist, transformative, pragmatic, and supercomplexity.

These various paradigm categorisations provide alternatives of ontology (the nature of reality in the research), axiology (the goals, ethics, and values of the researcher), epistemology (the nature of knowledge and how it may be discovered in the research), and methodology (the procedures by which information is obtained in the research) for social researchers. By clearly addressing paradigm(s) of the research, appropriate research design becomes more easily determined. Therefore, the implementation and findings of the research can be firmly and consistently approached (Lincoln et al., 2011; Ling, 2017; Ling & Ling, 2017).

More than one paradigm may underpin a research project if its research questions align with inquiry components pursued in different paradigms (Ling & Ling, 2017). My research is predominantly influenced by an interpretivist paradigm, yet aspects of a transformative paradigm also informed how I designed this research project. In the next section I present a detailed account of interpretivist and transformative paradigms to identify the essential foundations of this study.

Interpretivist Paradigm

Ling and Ling (2017) point out that 'an interpretivist research exercise is not aimed at uncovering the state of the world – or the bit of it researched – but at providing an evidenced, coherent, subjective understanding of the matter' (p. 7). This paradigm suggests a 'social construction of reality', where the researcher and research participants are engaged actively with an aim of assigning meanings to their interactions in their social world, whether or not patterns exist (Leavy, 2017; Ling & Ling, 2017).

An interpretivist research project is constructed through the researcher's constant observation and personal insights in a specific social context. Within this paradigm, a single research subject may have varied and alternative representations reported by different researchers. A research subject may be investigated in multiple social constructions and in multiple individual locations, with multiple interpretations of the

outcomes, none of which are more or less justifiable than the others (Ling, 2017). In the case of creative pedagogies – a recurrent theme in this study – preliminary research has been published observing pedagogical practices in multiple social realities (Amponsah et al., 2019; Cheung, 2016; Cheung & Leung, 2013; Cremin, 2015; Li & Li, 2019; Liao et al., 2018; Lin, 2010, 2011, 2012, 2014; Robinson et al., 2018; Selkrig & Keamy, 2017; Tasler & Dale, 2021). I have expanded on the ideas and values presented in those studies with the intention of implementing findings in a learning community, where indigenous ways of knowing can be incorporated to support the scaffolding of environmental learning.

Therefore, I aim to understand the creative pedagogy praxis of ITE educators, especially for environmental learning, in an Indonesian Initial Teacher Education (ITE) program. Praxis here is defined as 'practitioner knowing and insider knowledge generation' (Eikeland, 2015). I acknowledge ITE educators as co-participants holding an essential position in my research. Their roles are inevitable in co-constructing the knowledge of creative pedagogies according to their values, motivation, intentions, and teaching conditions in presenting environmental learning. I define knowledge in this research as my individual understanding about ITE educators' realities, which are derivative of systematic structured research methods (Lincoln et al., 2011; Ling, 2017).

I undertook this research in an exploratory manner, open to producing knowledge in relation to creative pedagogy praxis, including a potential modification of the theoretical framework of creative pedagogy to support the establishment of transformative environmental learning. I now move to the account of transformative paradigm to describe changes that I sought to establish in this research.

Transformative Paradigm

The transformative paradigm shares similar ontological and epistemological assumptions with the interpretivist paradigm. However, research within transformative worldviews is conducted to infuse actions for social justice and human rights agenda (Ling & Ling, 2017; Mertens, 2009). The spirit of transformative worldviews is to

advocate for research co-participants' voices, to work collaboratively with them, and to bring change to their lives (Creswell, 2014; Mertens, 2009).

In the realm of education research, Mertens (2015) states that transformative worldviews emerged to bring equity to diverse communities through effective interventions beyond curriculum and pedagogical practices. It is, however, a fallacy to think that a transformative worldview is only appropriately implemented by researchers working with marginalised communities, since oppression could take form in any basis, or anywhere (Mertens, 2009). In developing countries like Indonesia, colonisation in academic disciplines is present. First, cultural perspectives from Western modernists have dominated, and thus, have heavily shaped the theory and practice of learning in formal institutions, including teacher education (Kincheloe, 2006). Second, environmental education movements were mostly instigated and implemented by non-government organisations (NGOs) from the Western world (Nomura, 2009), again indicating a colonisation effect in relation to academic environmental learning in Indonesia. Third, educational learning materials were mainly produced by educational experts from 'an exalted domain' (Kincheloe et al., 2011) such as the USA. In light of these cases, I embraced findings that demonstrated potential strategies to decolonise the teaching and learning in the university from which I collected my data, through the perspective of ITE educators as cultural workers (Freire, 2005; Smith, 2012).

ITE educators, as professionals who produce 'culture', have abilities 'to reclaim, rehabilitate and articulate indigenous cultures, and implicit leadership over 'the people' as voices able to legitimate a new nationalist consciousness' (Smith, 2012, p. 135). In this research I promoted these abilities by providing an intersection where Western concepts of creative pedagogy and environmental learning met Balinese Hindu indigenous knowledge and tradition. Smith (2012) describes this as a way of 'giving voice' to life sections of indigenous communities to become part of a methodology. In this sense, my research serves as a space for Balinese Hindu communities to incorporate their indigenous knowledge and traditions into their creative pedagogy praxis for environmental learning. Opportunities for the co-participants to provide mentoring and leadership were also supported as my co-participants, who were indigenous scholars,

collaborated with me in a manner where I located myself within the 'insider' frame (Smith, 2012).

My co-participants and I, who are Balinese Hindu, lived within systems highly embedded in an indigenous ontology called *Tri Hita Karana (THK)*. *THK* represents three traditional concepts governing harmonious interconnection between human beings, nature, and spiritual forces. This 'human–nature connectedness' philosophy is defined by Klaniecki et al. (2018, p. 1375) as 'cognitive, emotional, spiritual and biophysical linkages to places, landscapes and ecosystems that are not completely dominated by humans.' A transformative paradigm provides a basis for this research to enable my co-participants and I to uncover this indigenous way of valuing and explaining nature, which potentially challenges or conflicts with Western scientific thinking.

Situating My Research Within Interpretivist and Transformative Paradigms

The design of this research was informed by an 'interpretivist paradigm' (Ling & Ling, 2017), in that inquiry regarding creative pedagogy praxis is best gained through observation and interpretation. This provides insights into inherent positions of both the co-participants and myself in investigating the subject of this research. In this case, my research was based on giving co-participants the control to construct their creative pedagogy praxis without neglecting any inequities they encounter. This strategic placement allowed me to act as a facilitator who was not fully detached from the research. In the meantime, a transformative paradigm guided me in assisting my co-participants to create changes within their teaching contexts.

By situating this research between interpretivist and transformative paradigms, the concept of knowledge as an individual understanding about the ITE educators' multiple realities is illuminated within personal and political agendas. Political here is defined as 'the play of power in social relationships' (Ling, 2017, p. 34). Thus, weaving together different ways of approaching research into a combined interpretivist-transformative framework crafted to suit this inquiry, just as the different types of *lidi* are combined into the *sampat lidi* that is appropriate for the sweeping purpose.

Research Design

The research design for my study was based on critical participatory action research (CPAR) to enable co-researching participatory activities where the ITE educators changed their teaching practice and built creative pedagogies for environmental learning. Presented through flexible self-reflective cycles (*plan*, *act and observe*, and *reflect*), the proximal goals and short-term goal of my research are formulated in a logic model (Figure 7) that provides directions for the CPAR activities. On a more personal level, this research promoted changes of my perspectives on creative pedagogies and environmental learning. Within this research framework, I viewed myself as a researcher with a 'reciprocal collaboration (insider–outsider teams)', to facilitate co-learning between ITE educators (a group of insiders) and myself (an insider into the context of previous employment at the university and an outsider in terms of being part of the teaching team) (Herr & Anderson, 2005). The co-learning occurred as co-participants and I shared our knowledge to construct new understandings of environmental learning and work closely to create action plans to establish environmental learning through creative pedagogies.

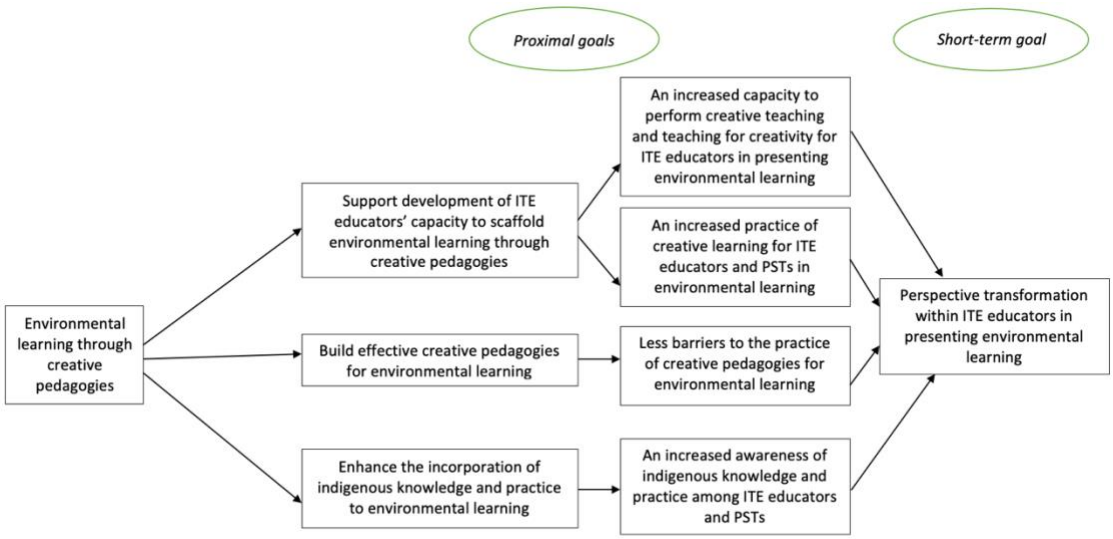


Figure 7 – Logic model of creative pedagogies for environmental learning

In this section, I explain perspectives of pedagogical inquiry in the context of determining an appropriate research design for my study. Critical participatory action

research (CPAR) is identified and explained within the framework of creative pedagogies for environmental learning. Creative pedagogy provides the general framing context, but its praxis was to be explored by ITE educators within this CPAR project – just as the broom structure in the *sampat lidi* provides a design pattern but can be created variedly by different choices of *lidi* bundles.

Situating Pedagogy in my Research

Researching pedagogy is a challenging task. Nind et al. (2016) state that the complexity of researching pedagogy lies in its dynamic, and often indeterminate, features, which arise differently in settings, in addition to interconnecting pedagogy dimensions such as relationships, prior experience, knowledge, opportunity to learn, meanings, actions, identities, agency, communities, participation, and time and space. Thus, it was suggested that one chooses research methods of researching pedagogy that 'align with what we assume pedagogy is' (p. 2).

For this research project, I define pedagogy as conscious initiatives that are designed to enable and enhance learning in another without neglecting the existence of constraints during participation in the activities (Nind et al., 2016; Watkins & Mortimore, 1999). Within this assumption of what pedagogy is, my research primarily focused on generating a more thorough conceptualisation of Lin's three dimensions of creative pedagogies framework (2011), which entails teaching for creativity, creative teaching, and creative learning (as detailed in Chapter 2). A small group of Balinese ITE educators were involved in this research into reconceptualising creative pedagogies for environmental learning. These educators were active researchers within this inquiry as they were 'co-constructors and professional partners rather than implementers of pre-planned intervention programmes' (Hogan, 2011, p. 378).

Critical Participatory Action Research (CPAR)

In general, action research refers to 'a form of systematic investigation that typically involves attempts to solve practical problems in real world settings through the involvement of stakeholders who work or live in those settings' (Willis & Edwards, 2014, p. 19). Therefore, it was an appropriate research framework for my study that

sought to resolve problems in the domain of environmental learning. In educational research, action research is known as practitioner research or classroom research (Scanlon, 2018). It has emerged to assist teachers in innovating teacher professional knowledge because the nature of teachers' tasks is often accepted as a classroom-based transmission of others' knowledge (Scanlon, 2018). Action research in education is defined as 'an inquiry conducted by educators in their own settings in order to advance their practice and improve their students' learning' (Efron & Ravid, 2013, p. 2). The framework of action research makes research more manageable for teachers inquiring into their practices through determination of a focus of inquiry and its exploration through cycles of action research (Baumfield et al., 2008). Systematic reflection in the action can be a solitary or collaborative process that involves self-reflective cycles of (1) plan a change; (2) act and observe the process and impacts of the change; (3) reflect on the process and impacts; and then (4) re-plan (Figure 8).

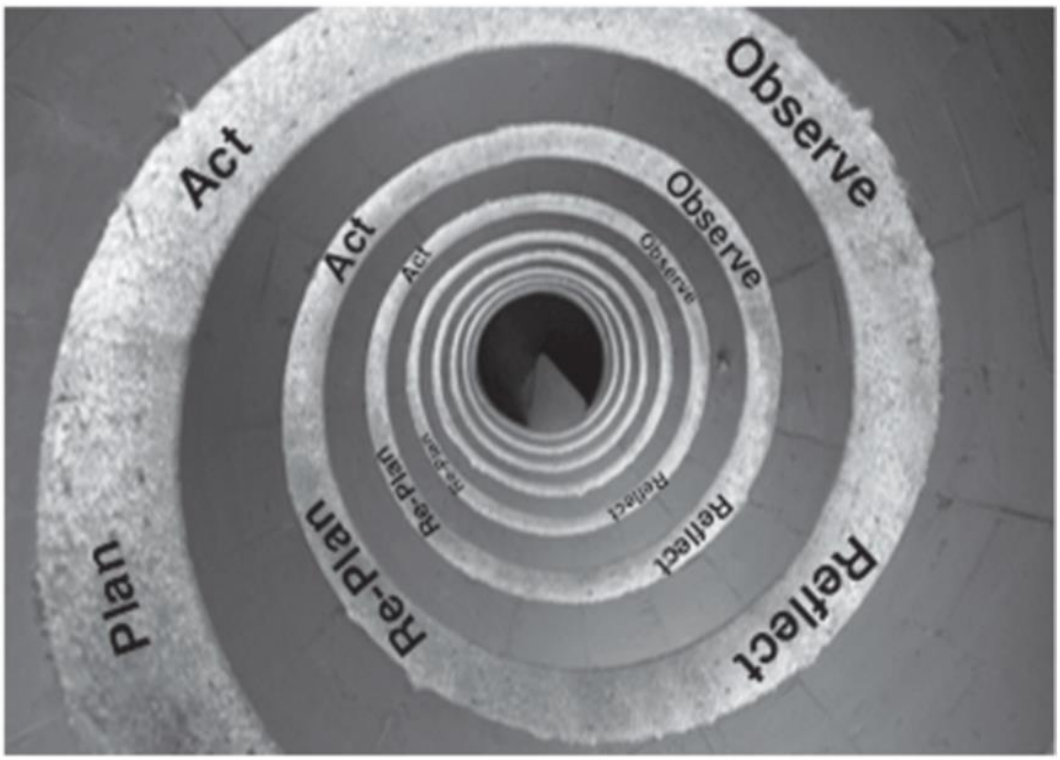


Figure 8 – The action research spiral (Kemmis et al., 2014, p. 19)

Action research is a far-reaching research approach that has a direct relationship with social action, such as transformative practice in socioecological communities, to create essential learning conditions for critical dialogue (Pyrch, 2015; Reason & Canney, 2015). Most literature on action research represents internal participants who are fully immersed in the research but often neglect the values of external expert input (Kemmis et al., 2014). In resolving this challenge, Kemmis et al. (2015) suggest a practice transformation that focuses on not only changes by one's own but also 'extra-individual' practices in three different arrangements: cultural-discursive, material-economic, and social-political process. By doing so, a space for assessing untoward consequences resulting from individuals' practices can be established. For this reason, a framework aspiring to build collective social transformations, called critical participatory action research (CPAR), needs to be used. A spiral of self-reflection cycles in CPAR is conceptualised as collaborative actions between co-participants and external researchers (Figure 9).

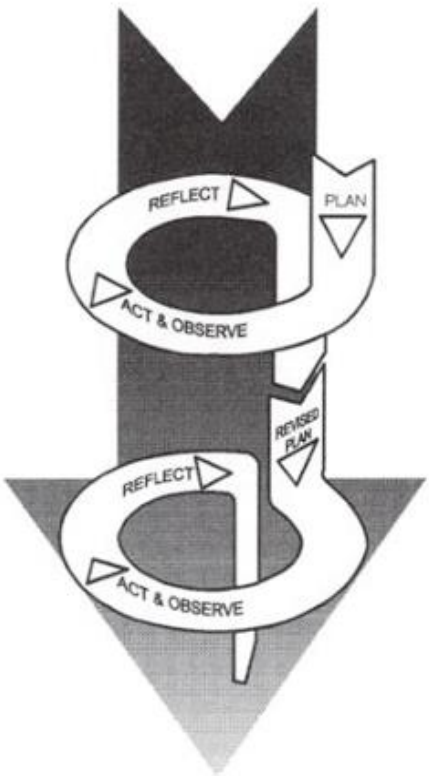


Figure 9 – The self-reflective spiral (Kemmis & Wilkinson, 2002, p. 22)

Kemmis et al. (2014, p. 12) highlight critical participatory action research as 'a commitment to bring together broad social analysis, the self-reflective collective self-study of practice, and transformational action to improve things.' CPAR as 'a practice changing practice' (p. 26) supports the aim of my research, which was investigating perspective change about environmental learning in a small group of ITE educators. The process of conducting CPAR itself has delivered a self-transformative experience – offering meaning, substance, and value in the involved community – where my co-participants' sayings, doings, and relatings were gradually reshaped (as detailed in Chapter 4).

Environmental learning is described by Taylor and Cranton (2013) as having limited documentation in the transformative paradigm. Besides filling the gap in the literature, designing my research in CPAR likely brings lasting change with respect to environmental learning inclusions to the institution where the ITE educators work at as CPAR emphasises *collective* communication and decision making (Willis & Edwards, 2014). For instance, Donovan (2016) reports that participatory action research built deeper and critical understandings of primary school children as they co-design collective actions through visual artefacts about sustainable consumption. Donovan's report provides an empowering insight that undertaking CPAR in my research could potentially generate such practical contributions.

CPAR has been employed in various social studies e.g. social policy evaluation (Sandwick et al., 2018), youth program evaluation (Zeller-Berkman et al., 2015), public housing redevelopment (Thurber et al., 2018), and reintegration acceleration in war-affected mothers (Worthen et al., 2019), indicating that CPAR is an appropriate design choice for research within a transformative paradigm. In educational settings alone, CPAR has been used to build greater connection of inter-professional groups (Coles-Ritchie et al., 2019; Nixon, 2016). It means that CPAR does not only provide space for social action but also room for critical conversation to unearth strategies in changing teaching practices (Coles-Ritchie et al., 2019; Nixon, 2016). These studies have advised my decision in applying CPAR as my research design.

Each spiral in this research includes *planning* a change, *acting* and *observing* the process and consequences of the change, *reflecting* on these processes and consequences, *re-planning*, *acting* and *observing*, and *reflecting* (see Figure 10, and note this figure is explained in more detail in forthcoming sections). These action research steps are more flexible than can be illustrated in a 2D figure during the intervention of creative pedagogies in this research, as suggested by Willis and Edwards (2014), to provide ITE educators with the sense of openness in constituting their own practices.

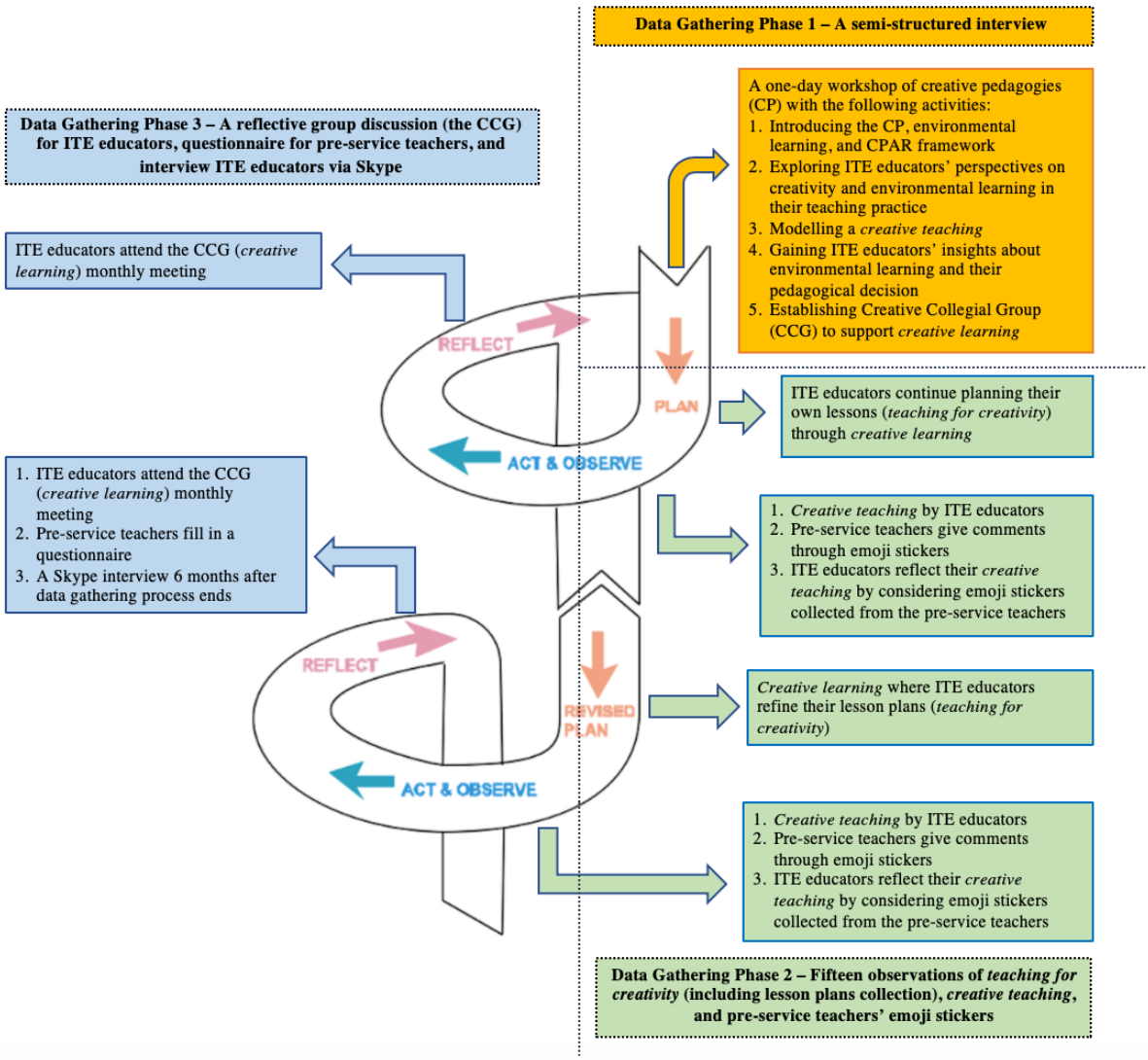


Figure 10 – Spirals Self-Reflective Cycles of Creative Pedagogies for Environmental Learning in the Proposed Critical Participatory Action Research

Kemmis et al. (2014) explain that co-participants in CPAR have full authority of the research, yet they are open to accepting support from external individuals (Kemmis et al., 2014). My role as a researcher was mainly assisting ITE educators in developing lessons based on creative pedagogies to scaffold environmental learning in their classes. Environmental learning had been a 'shared felt concern' of ITE educators for years in the university I worked at and had been seen as 'worth investigating' and 'worth acting on' (Kemmis et al., 2014, p. 149). Therefore, environmental learning became the central focus of this research.

I also considered the importance of establishing 'public spheres' in order to cultivate validity and legitimacy of the knowledge and action being studied in this CPAR project. A public sphere called *Creative Collegial Group* (CCG) was formed as a core dimension of this CPAR following ten key features proposed by Kemmis et al. (2014). CCG was an actual circle of communication among my co-participants to collectively make decisions about what to explore and what to alter during the execution of the research activities. Hence, I emphasised the first person (plural) as 'we' or 'us' during my interaction with them. In this circle, ITE educators deliberately practised 'collaborative creativity' to generate new pedagogical practices for environmental learning (Glăveanu, 2011). CCG was a forum where the creative pedagogy and environmental learning teaching practices of each co-participant were socially evaluated every month. The purpose of this evaluation was to manage any unexpected, irrational, unsustainable, or unjust consequences that might appear in their teaching practices. As Rallis et al. (2006) suggest, CCG was also a safe space for ITE educators to emotionally and intellectually support each other. To ensure reciprocity between my co-participants and I, I initiated short follow-up meetings after every classroom observation.

Engaging Participants, Data Gathering, and Documenting

Data gathering procedures are like constructing a *sampat lidi* from coconut leaves – a coordinated series of connected activities that form the *sampat lidi.* This process includes selecting and cleaning the leaves, cutting and separating them from their central spines, exploring different tightening instruments, and taking the *sampat lidi* outside on a sunny day to ensure it is dry before use. In this section I outline the

coordinated and connected data gathering procedures. This starts with outlining the site of, and selection of the participants for, this study. I then discuss the data gathering activities. The next part explores different instrumentations designed and used in the research, culminating in a detailed account of the spiral self-reflective cycles of creative pedagogies. Lastly, I discuss data gathering considerations, which encompasses issues and strategies to ensure ethical, trustworthy research procedures.

Entry into the Field

My study took place in Bali, a small island in Indonesia. Indonesia is a country with diverse cultures, customs, and traditions (Matthews, 1995). Every island has its own unique indigenous cultural and environmental practices, some of which are still underrepresented in the Indonesian formal curriculum, such as the Balinese *subak* cultural landscape (SCL), which is an ancient cooperative farming practice that manages several complex systems, namely water irrigation, water temple networks, rice terraces, and farmer groups (Roth & Sedana, 2015; Surata, 2013; Surata & Vipriyanti, 2018). From my three-year personal experience as an assistant lecturer in Bali, bringing the Balinese indigenous concepts to teacher education has created opportunities for revisiting and reconnecting the ways Balinese Hindu communities value and explain nature.

University Selection

I carried out this project in collaboration with a private university in Bali. Private universities are known to be more adaptive and responsive to changes that are critical to their existence as they are driven by the choice and satisfaction of educational consumers (Geiger, 1985). In Indonesia, private university students are reported to be more demanding about curriculum design, course design, communication with staffs, graduation, individual studies, and classroom studies compared to the public university students (Wulandari & de Jager, 2018). This factor may affect the ITE educators' choice of pedagogies to create impactful experiences of individual and classroom studies. It is worth noting that due to the nature of private universities and students within this context, the ITE educators who participated in this research altered their current pedagogies to creative ones relatively quickly when they perceive creative pedagogies

as effective tools to enhance the PSTs' learning satisfaction. Thus, the PSTs' responses in relation to pedagogical changes that were undertaken by their lecturers is another aspect of this research, to gauge the 'end users' perspectives regarding the effectiveness of creative pedagogies for environmental learning.

The chosen university for this study represented convenience sampling due to my previous relationship with the university and the ITE educator co-participants as staff members (Robinson, 2014). It made for an effective strategy to obtain permission to conduct the research and brought a non-disruptive intervention, as effective environmental learning was already understood as one of the university's flagship research areas. In other words, I worked within an 'insider' frame (Smith, 2012, p. 328), potentially gaining access to more nuanced understandings than if the research was situated at another university. These reasons have increased the manageability and feasibility of my research within a limited time frame (Efron & Ravid, 2013).

I implemented ethical approaches following the Australian National Health and Medical Research Council Act (NHMRC) guidelines for this research with ITE educators and PSTs, and approval was granted by the Victoria University Human Research Ethics Committee (VUHREC) [Approval ID: HRE18-246]. I sent an initial letter to request permission for conducting the research to the Dean of Faculty of Teacher Training and Education and the Head of Biology Education Department. I chose the biology education department in consideration of its teacher graduates' responsibilities in envisioning environmental learning in the near future (McGinnis et al., 2012). This goal was also reflected in several courses (units of teaching) offered by the department, where environmental learning has been presented to PSTs, namely *Ecopedagogy* and *Contextual Teaching and Learning*. Courses in the department were further tailored to equip PSTs' research skills with real-world experience and teaching skills to be future facilitators of transformative learning. Furthermore, ITE educators in the department were currently developing Learning Management System (LMS) elements to accommodate active, creative, and independent traits in PSTs. Accordingly, this university site presented a strategic selection for my research, which sought to understand creative pedagogies and environmental learning.

Co-participants Selection and Recruitment

After gaining permission from the Dean of Faculty of Teacher Training and Education and the Head of Biology Education Department, I delivered invitation letters and informed consent forms to ITE educators in the department. The numbers of invited participants were based on those who worked in the department, which happened to be equal numbers of females and males ITE educators.

I applied criterion-based selection that guided me in my identification of a suitable participant sample (Efron & Ravid, 2013; Merriam, 2014; Merriam & Tisdell, 2016). I selected three ITE educators who responded on a first-come-first-served basis according to several inclusion criteria: (1) at least three years teaching experience, (2) awarded as a professional lecturer by the Indonesian Ministry of Research and Higher Education, (3) experience in conducting classroom action research or any other educational research, (4) willingness to be an active and collaborative colleague in the Creative Collegial Group, and (5) willingness to try creative pedagogies. The first and second criteria ensured that co-participants had at least 10 hours of teaching per week and a relevant masters level degree. It means that they possessed adequate knowledge and experience in teaching so that they were ready to apply and modify a new form of pedagogy. The third criterion was important to ensure that they were familiar with procedures and strategies of conducting educational research since they would be co-participants of the CPAR project and might give suggestions or ask for alterations of the research conduct. If the fourth and fifth criteria were fulfilled, it means that the co-participants possessed a strong desire and commitment to collaborate in this research. However, if they changed their mind, they were free to withdraw from my research at any stage. I notified all co-participants they could opt-out of my research whenever necessary (DuBois, 2002; Wood & Smith, 2016).

Profiles of my Co-participants

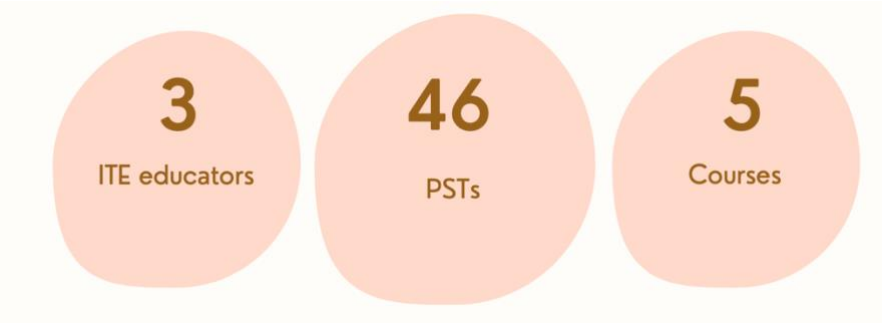


Figure 11 – An infographic of the research participants

Three ITE educators fitting the selection criteria volunteered in my research (Figure 11). According to Young and Casey (2019), a relatively small sample size within an inquiry should not be viewed as a limitation as it can lead to robust qualitative findings, provided participants fulfil pre-determined criteria, participants express similar experiences, and interviews are structured. In this research, the three ITE educators were active contributors in all research activities. I use pseudonyms for all parties:

1) Reka, a male in his 60s, who had been teaching at the university for more than 20 years. His research and scholarly work focused on the integration of learning, ecology, and culture. He combined both English and Indonesian in expressing his opinion within our introductory workshop and Creative Collegial Group (CCG) meetings.
2) Aya, a female in her 30s, who had been teaching at the university for more than 5 years. Her research and scholarly work focused on the integration of learning, biodiversity, and social interaction. She used Indonesian in expressing her opinion within our introductory workshop and CCG meetings.
3) Ryan, a male in his 30s, who had been teaching at the university for more than 5 years. His research and scholarly work focused on the integration of learning media, biosecurity, and character building. He used English and occasionally Indonesian in expressing his opinion within our introductory workshop and CCG meetings.

The three co-participants also encompassed their 46 students (pre-service teachers) in their classes, all who had a minor role in the research activities. The PSTs were invited

to contribute their anonymous ratings about learning activities during the CPAR cycles. In the end of the CPAR cycles, these PSTs were also encouraged to complete an anonymous electronic survey.

Overview of Data Gathering Activities

In CPAR projects, the term *gathering evidence* is used as opposed to *collecting data*. Kemmis et al. (2014) explain that the term was coined in relation to its primary purpose, which was 'to feed and nurture self-reflection, especially collective self-reflection, in public spheres' (p. 176). However, there are tensions in the use of the term *evidence* within the interpretive community since it is associated with 'a countable or measurable sense', which include characteristics pursued by the evidence-based community, such as positivist and post-positivist researchers (Denzin & Giardina, 2016). It is important to acknowledge that *data* in my qualitative research could not be replaced by *evidence,* since *data* itself constitutes a complex interpretive process rather than just facts collected from the research field (Denzin & Giardina, 2016). Moreover, I collected *data* to be coded and analysed, not generalised. Therefore, in this research I choose the term *data gathering* or *data collecting*.

I conducted data collection in a spiral of self-reflective cycles across three phases, namely an introductory workshop on creative pedagogies (*plan*), a praxis of creative pedagogies through classroom observations (*act and observe*), and the Creative Collegial Group (CCG) meetings (*reflect and re-plan*). I delivered a plan of methods of collecting data to my co-participants. Reading through the plan allowed my co-participants to (1) picture issues that might arise, and (2) consider other methods that would generate information about how they could change their practices and the conditions under which their practices were carried out (Kelly, 2017; Kemmis et al., 2014). Further, I reminded my co-participants to create their own records about their practice in the form of a journal. I chose journal over other methods as a journal assists the co-participants capture important contexts, such as their impressions, ideas, and cues, which may not be sufficiently recorded through the video- and audio-recording. These records would be beneficial, again, in reflecting on their

practice and when exchanging experiential accounts with other co-participants during the CCG meetings. Journal sharing was not compulsory in my research, as I collected videos, audios, pictures, counts of emoji stickers for rating practices, and results of student questionnaires, and shared them with my co-participants in the CCG meetings. I used varied data collection methods that collect visual and textual data to obtain required significant depth within this CPAR project.

One major data gathering technique that I employed in this CPAR was classroom observation. Classrooms represent a natural setting for the ITE co-participants and PSTs. Thus, observation generated well-collected qualitative data 'with strong potential for revealing complexity' (Miles et al., 2014, p. 8). Among various approaches of observation, I chose a semi-structured observation for my research. I undertook this type of observation by writing structured reflection and impressions of what I found in the classrooms in an observation table with a set of pre-established criteria (O'Leary, 2013). I adopted an unobtrusive manner proposed by Wood and Smith (2016) where I did not initiate interaction with those being observed.

Since observation is often seen as leading to bias, I also employed other data gathering methods to understand the praxis of creative pedagogies for environmental learning: reflective group discussions; emoji stickers collection; informal follow-up discussions; and electronic survey. Kemmis et al. (2014) mention multiple data gathering methods as efforts to enhance the degree of credibility in CPAR findings. Multiple data sources enriched my report of creative pedagogy practices and the conditions under which co-participants practised them. In this research, the qualitative approach of data gathering supported the exploration of my co-participants' views and interactions on environmental learning promoted by creative pedagogies in their real-world contexts (Yin, 2018). Further, these qualitative data helped me in establishing a holistic picture of a comprehensive set of patterns, categories, and themes to understand the meaning that co-participants possessed about creative pedagogies in reframing environmental learning in an Indonesian initial teacher education program (Creswell & Creswell, 2017).

Qualitative Approaches in Data Collection

According to Denzin and Lincoln (2011), a qualitative approach is a practice of inquiry where the researcher, situated in natural settings, acts as a 'bricoleur' to assemble and interpret the world through a series of representations such as interviews, artefacts, casual conversation, field notes, recordings, and photographs. These series of representations indicate that a qualitative approach provides a lens to further understand the experience of co-participants. Moreover, the exploratory manner promoted by qualitative research complemented the purpose of my research, which was to inquire into meaningful change happening in my co-participants' teaching practices (Spencer et al., 2014).

Benefits of applying qualitative approaches in framing creative pedagogies have been demonstrated by Lin (2014), such as 'to obtain an in-depth understanding of the participants' responses and the dynamic interactions between the new pedagogy and the local context' (p. 46). Furthermore, my research encompasses interdisciplinary endeavours which is better presented qualitatively to locate multiple entry points in its report (Inwood, 2013).

Research Phases

In my research, I completed data gathering activities through three research phases: Phase I (*plan*) – Introductory workshop on creative pedagogies; Phase II (*act and observe*) – Praxis of creative pedagogies; and Phase III (*reflect and re-plan*) – Creative Collegial Group (CCG) meetings. I present a detailed account of each phase in the following sub-sections.

Data Gathering Phase I (Plan) – Introductory Workshop on Creative Pedagogies (CP)

Brown's (2008) stages of design thinking (inspiration, ideation, and implementation) inspired me to plan a series of activities, which I am going to refer to as implementation activities, for this introductory workshop. Design thinking is originally 'a methodology that imbues the full spectrum of innovation activities with a human-centered design ethos' (p. 86). In this research, I applied this approach to invite my co-participants to

experience creative processes themselves. These activities were also tools for imagining the creative experiences that my co-participants can bring into their classroom to introduce environmental learning. The inspiration and ideation stage of this introductory workshop involved: (1) introduction and modelling of the framework of creative pedagogies, environmental learning, and CPAR; and (2) discovery of the ITE educators' stance on creativity and environmental learning in their teaching practices. The former aim was achieved through interactive discussion, while four different activities were incorporated to explore the ITE educators' perspectives on creativity and environmental learning (Figure 12). The last stage of Brown's design thinking (implementation) can be seen within my co-participants' praxis of creative pedagogies. Occurring in Phases II (*act and observe*) and III (*reflect and re-plan*), the implementation stage leads to another stage of ideation or inspiration – that shows design thinking as 'a system of spaces rather than a predefined series of orderly steps' demarcating different sorts of related activities (p. 88).

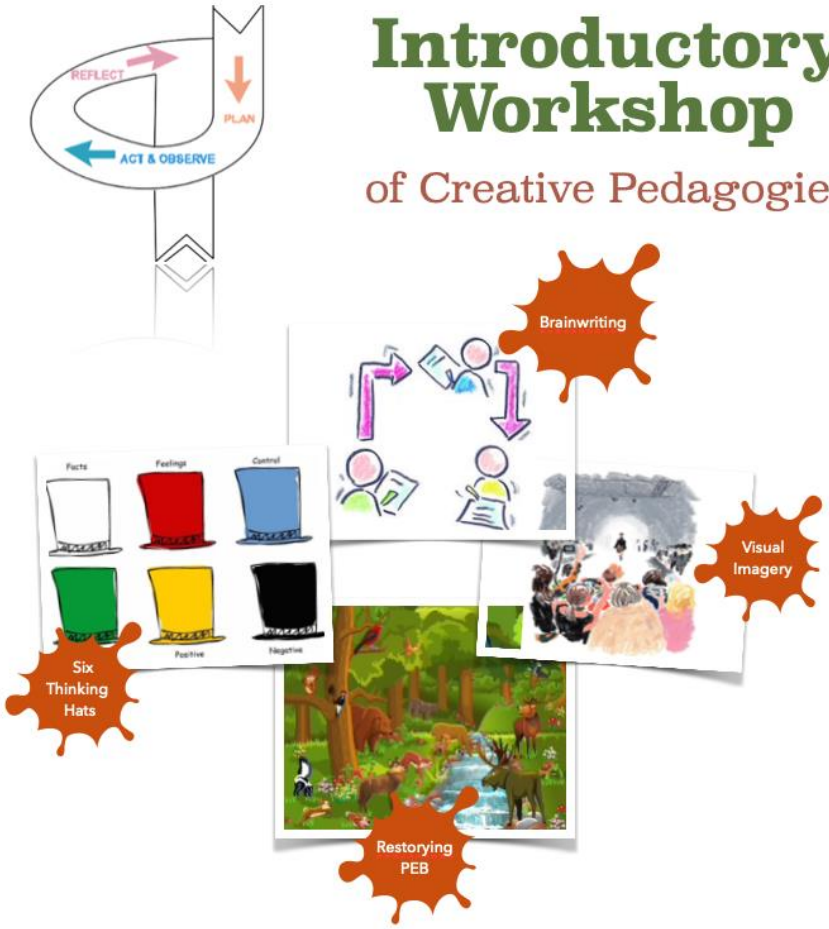


Figure 12 – Infographic of activities that were presented in my research phase I

The first activity of the introductory workshop was brainwriting. Le Hénaff et al. (2018) define brainwriting as an idea-generating activity commonly used in group settings, which involves writing in silence on paper slips, such as sticky notes. Brainwriting generates more ideas compared to verbal brainstorming since brainwriting allows participants to follow their train of thoughts without any disruption, eventually sharing them in a forum for discussion (Korde & Paulus, 2017). Unlike oral brainstorming, which has anxiety-provoking properties (e.g., evaluation apprehension), brainwriting sessions contain anxiety-reducing properties that likely stimulate unique and creative ideas (Coskun, 2011; Michinov, 2012). A brainstorming session creates evaluative environment where individuals are required to deliver ideas orally. This condition tends to disadvantage high anxious participants and increase the possibility of all participants agreeing with the most eloquent individual. Brainwriting techniques offer more structured and convenient way for participants to contribute thoughts, even generate several possible solutions, in silence. These properties helped me to reduce feelings of anxiety among the co-participants resulting from power, reputation, and status difference (Kemmis et al., 2014) within their roles in the university.

Brainwriting enabled me to infuse creative learning into the introductory workshop on creative pedagogies. I used brainwriting to explore two themes:

(1) how ITE educators view creativity in their teaching (e.g., *how would you describe creativity in the biology education department, what do you think will support/hinder PSTs to be creative in your class?* and *how would you describe PSTs enrolled in your classroom?*).

(2) what aspects of environmental learning they want to focus on (e.g., *what is your focus for environmental learning? what is your desired outcome and why?, what knowledge about environment matters?, what do you like about the area where you live?, what worries you?,* and *what would you like to see changed?*).

The second activity was called ‘six thinking hats’. The six thinking hats activity was designed by De Bono as a parallel thinking tool to perform problem solving, critical thinking, and creative thinking from different angles (De Bono, 1991, 2000; Göçmen & Coşkun, 2019; Vernon & Hocking, 2014). In this activity, I asked my co-participants to

choose one or more hats to plan their future environmental learning practice. This technique helped me with screening how co-participants' thoughts regarding environmental learning have been shaped, as each hat was associated with a particular style of thinking (Vernon & Hocking, 2014). Six thinking hats as a learning strategy enables co-participants explore concept of environmental learning from varied perspectives before deciding the best approach to deliver it within their units of teaching. When co-participants examine six different perspectives, they also engage with potential challenges of administering environmental learning. This process guides co-participants through transformative learning experience as they predict and negotiate their future teaching strategies, as well as reflect their past practice. As a result, I collected a set of recommendations to interpret why certain teaching strategies were employed in my co-participants' creative pedagogy praxis. I presented a brief representation of hat colours in Figure 13.

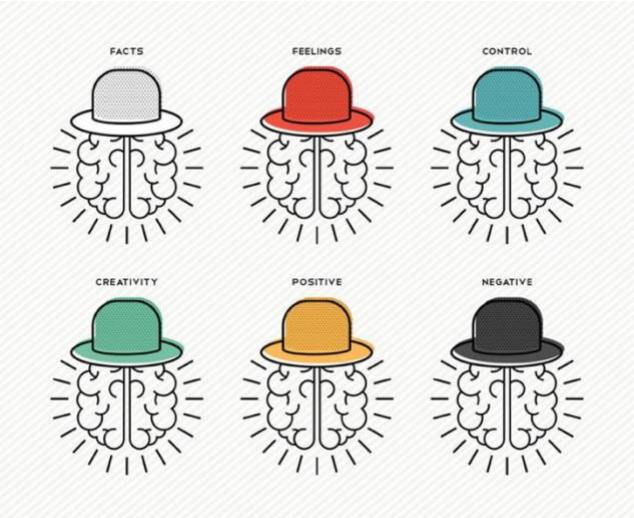


Figure 13 – Six Thinking Hats
Source: https://www.thepersimmongroup.com/six-thinking-hats-use/

The third activity was choosing visual imagery. Visual imagery is a multimodal means that carries visual design, rhetoric, and often cultural critique (Jeffrey Robert et al., 2018). I provided eight postcards that I downloaded from www.pinterest.com to help co-participants decipher, analyse, and reflect their practice of environmental learning (Figure 14). According to Hafford-Letchfield and Huss (2018), visual imagery engages individual with imagination about their social reality to elicit personal interpretation through content analysis. In this CPAR, co-participants' social reality includes collegial

relationship and perceived connection with students. I gleaned co-participants' individual reflective accounts from this activity through personal imagination as suggested by Dirkx (2001). These images re-emerged as important vehicles of creative learning for my co-participants as they relate and analyse the content of visual imagery with familiar problems or social reality they experienced during past teaching practice.

Figure 14 – Eight postcards provided for co-participants to elicit their current environmental learning practice
Source: www.pinterest.com from artists, top left to top right: Damien Florébert Cuypers; Suzanne Etienne; Trish Jones; Leonid Afremov. Bottom left to bottom right: Vladimir Volegov; Anna Silivonchik; Rebecca Jones Giclee; Lee S. Hee.

The last activity involved the use of metaphor in re-storying pro-environmental behaviour. Inspired by Siegel et al. (2018), the activity sought to engage co-participants with 'multiple and interconnected factors that encourage humans to actuate pro-environmental behaviour' (p. 189). I asked my co-participants to imagine a living forest and its components. The forest represented pro-environmental behaviour while its components illustrated interconnected elements that constituted pro-environmental behaviour. The activity facilitated co-participants to discover the network of outer and inner factors that guided pro-environmental behaviour. The use of a storied metaphor as an open-ended and creative activity enabled the co-participants to draw from both their Western-influenced academic narratives and their Balinese cultural stories. This activity also facilitated what Qi (2014) refers to as an emancipatory space to understand and

balance the dominant production and adoption of Western knowledge in contemporary teacher education.

These activities provided a structure for the introductory workshop that enabled my co-participants to gain an understanding of creative pedagogies and plan for teaching with creative pedagogies, as well as enabled data gathering on different aspects of the ITE's perspectives. I used all the data gathered in the introductory workshop as a basis for the third phase of data gathering during the ITE educators' praxis. In the next sub-section, I presented the detailed account of Phase II.

Data Gathering Phase II (Act and Observe) – Praxis of CP Through Classroom Observations

The data gathering of Phase II comprised of classroom observations and emoji stickers collection (Figure 15). Classroom observation functions as a tool for assessing, assuring, and enhancing teachers' performance, professional skills, and knowledge base (Nind et al., 2016; O'Leary, 2013). In this research, I used classroom observations to record my co-participants' praxis of creative pedagogies for environmental learning.

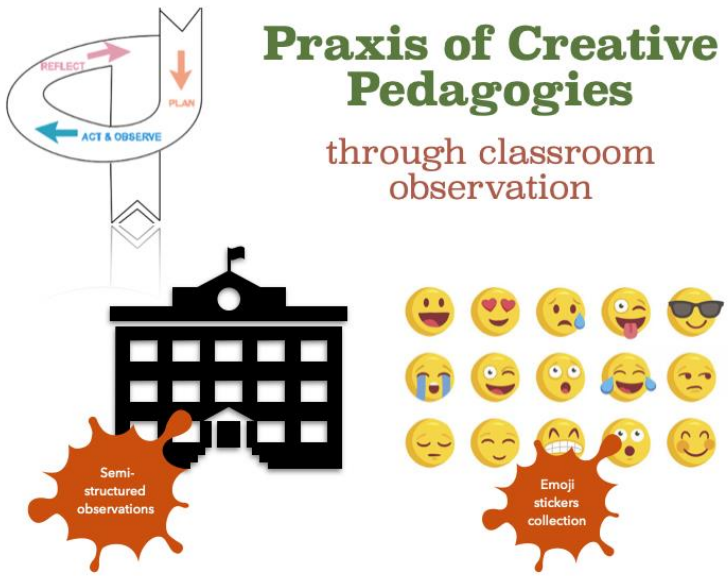


Figure 15 – Infographic of activities that comprised research for Phase II

I adopted a semi-structured observation method in this research, with records of observation remaining structured and consistent with the use of a set of pre-established

criteria (O'Leary, 2013). Semi-structured observation allows me to insert, amend, and delete the reference point (a set of pre-established criteria) for greater accountability compared to the unstructured observation. In this context, I am guided by the accompanying criteria for me to consult when recording my comments in relation to co-participants' observed lessons. For this purpose, I developed an observation checklist through careful considerations of the teaching and learning elements that enhance creativity. I synthesised these sets of elements from various sources and perspectives on nurturing creativity (Craft, 2015a, 2015b; Craft & Jeffrey, 2015; Harris, 2017; Harris, 2016; Jeffrey, 2006; Lin, 2011, 2014; Lucas, 2016; Sale, 2015) and environmental learning in the classroom (Inwood & Taylor, 2012; Rickinson, 2006; Rickinson et al., 2009; Rousell et al., 2018). This type of observation allowed me to build qualitative accounts that were framed by pre-established categories and ensured consistency between data gathering observation activities. The observation checklist can be seen in Appendix 1. Other type of observation (highly structured) is not considered within this CPAR as this observation primarily imposes on a record of numerical data over that of textual data, for example percentage over qualitative feedback. With its performative observation nature, I believe that highly structured observation does not align with the aim of this CPAR i.e., recording co-participants' creative teaching practice rather than assessing it.

During my observations, I employed three types of recording methods, as suggested by Wragg (1999): written accounts, video recording, and sound recording. A written account offered a full description, made available for immediate follow-up discussion with my co-participants after the class. Videos provided me with good visual and sound recordings of classroom interactions and were a medium that could be revisited whenever necessary. One weakness of video recording was presumably 'some effects on class of presence of camera' (p. 17). Therefore, I put the video recorder in an unobtrusive location at the back corner of the class, but this meant there was a high chance of poor audio recorded with low volume. Hence, I placed a cell phone on my co-participants' desk. The centrally placed cell phone elicited a high-quality audio record of what co-participants said and could be used for corroboration of my written account of class observations.

‘Smiley stickers’ are forms of positive reinforcement that are commonly given by teachers to students (Burden, 2016). In this research, I reverse the usual use of emoji stickers by asking the PSTs to give emoji ratings for their lecturers. In the end of every teaching session, I asked the PSTs to choose one of two emoji stickers to rate their learning experience. I provided a box in the front corner of the class for emoji sticker vote posting; thus, identification of PSTs’ identities and their choice was virtually impossible. I conveyed the total collected ☺ and ☹ stickers to each co-participant after each class.

I combined the data collected from Phase I (*plan*) and Phase II (*act and observe*) and used it as foundation for reflective action in CCG meetings. The following section details the accounts of Phase III (*reflection and re-planning*).

Data Gathering Phase III (Reflect and Re-plan) – Creative Collegial Group (CCG) Meetings

The last phase of data collection consisted of three activities, namely Creative Collegial Group meetings (at the end of each of the two CPAR cycles), and a PST online survey as a concluding remark of the CPAR cycles (Figure 16).

Figure 16 – Infographic of activities comprised in the research phase III

I designed the CCG meetings, or reflective group discussions, on the notion of critically reflective teaching proposed by Brookfield (2017). Critical reflection is defined as 'the sustained and intentional process of identifying and checking the accuracy and validity of our teaching assumptions' (p. 3). I used three specific lenses during the CCG meetings to structure conscious reflections, namely students' eyes, colleagues' perceptions, and personal experience (Brookfield, 2017). Two CCG meetings were administered with semi-structured guides i.e., tuning structured conversation protocol (see Table 4) and zones pie chart in this research (see Figure 18). As suggested by Guest et al.'s (2017) findings, two or three group discussions will likely represent at least 80% of themes on a topic when research uses a semi-structured guide. The procedural details for structuring the CCG group reflection meetings through these three lenses were:

1) Reflection through the lens of 'students' eyes' –

   To gain students' views I collected emoji stickers (Figure 17) from the PSTs. My co-participants and I discussed the yield of emoji stickers in our CCG group meetings. Emojis have conveyed emotion, messages, and meanings in our computer-mediated communication for decades (Ying & Khe Foon, 2019). I adopted the idea of using emoji stickers in this research for the purpose of gathering PSTs' ratings of experiences in classes where creative pedagogies were being implemented. In other words, emoji stickers were a mode of expression used to convey PSTs' feelings. I reported the numbers of ☺ and ☹ collected to my co-participants after class observations and in CCG meetings.

Figure 17 – Emoji stickers collected from PSTs after each teaching session
Sources: www.google.com

Apart from the CCG meetings, an online survey taken by the PSTs was also a part of the research Phase III. I provided a link to an electronic questionnaire to all PSTs

enrolled in my co-participants' classes. I presented questions as interpretive items (Stake, 2010), where single choices and star ratings were both equipped with space to elicit responses. Participation in the survey was anonymous, free, and voluntary, to reduce the ethical issue of dependent relationships. Dependent relationships are commonly found in student-teacher relationships, doctor-nurse relationships, or child-parent relationships. Kemmis et al. (2014) explain that this kind of relationship has a tendency for influencing dependent persons to participate in a research project because they are driven by a fear of penalty or repercussion if they do not participate. Therefore, as I distributed consent forms, I also informed all PSTs that there would not be any pressure to fill in the questionnaire and no consequence would follow if they refused to complete it. There were 46 PSTs who accepted the invitation to complete the electronic anonymous survey at the end of the CPAR cycles. I provided the results of the questionnaire to my co-participants as another means of gaining critical perspectives from a student lens (Brookfield, 2017). The online survey questions can be seen in Appendix 2.

2) Reflection through colleagues' perspectives –

   I designed the 20-minute Tuning Structured Conversation Protocol (Table 4) for the co-participants to provide feedback on my implementation strategies. I adapted the protocol from the 60-minute Tuning Protocol by Hughes (2016); National School Reform Faculty (2015); Selkrig and Keamy (2015), which can be used with small groups of people. The Tuning Protocol refers to a technique for educators to showcase their works before their peers in a systematic and reflective confabulation to generate 'thoughtful, critical feedback to 'tune' the work to a higher standard' (Paulsen et al., 2016, p. 21). Selkrig and Keamy (2015) argue that protocol-based conversations not only offer a 'respectful, transparent and powerful' medium to enable colleagues to highlight a particular practice but also to enhance our understanding about the complex layers of 'collegiality, conversation and critical reflection' in shared reflections on teaching (p. 432). A summary of the Tuning Protocol for use in the CCG meetings is displayed in Table 4.

Table 4 – Summary of the 20-minute Tuning Protocol of CCG

Present [4 minutes]

1. The presenter shares the context of their teaching practice, such as aims, goals, and challenges.
2. The presenter ends his/her presentation by framing a focus question or a dilemma question as a parameter for the group's feedback.

Clarify [2 minutes]

1. Participants ask clarifying questions that aim to gather additional information and clarify the presenter's teaching context. These questions require brief and factual answers to allow the participants to understand the problem (focus question) better.
2. The presenter answers the clarifying questions.

Clarify further [3 minutes]

1. Participants ask follow-up or probing questions to explore and investigate the problem deeper e.g., *What made you decide ...?; Does it meet the PSTs' needs?; How does this relate to … ?*
2. The presenter takes notes on these follow-up questions without giving any response.

Warm and cool feedback [4 minutes]

1. The presenter should now physically remove him/herself from the forum but stay close enough to hear and turn so they are not making eye contact with anyone. In this position, the presenter takes notes of the discussion.
2. Participants imagine that the presenter has left the room. The dilemma question is displayed on the screen.
3. Participants provide warm and cool feedback for the presenter. Warm feedbacks are in forms of comments about the teaching practice, focusing on its strength and where the teaching practice seems to meet the desired goals. On the other hand, cool feedback covers suggestions or new ideas in order to enhance the teaching practice, especially with regard to the focus question. In presenting cool feedback, the facilitator reminds the participants to begin with 'I wonder …' statements. The presenter is silent.

Reflect [4 minutes]

1. The presenter is invited back to the forum. He/she can now respond to warm and cool feedback given previously. Participants are silent. The time is also used to reflect aloud on those ideas or questions that are interesting or helpful, not necessarily on every point. The presenter may describe the next steps to be taken.
2. Facilitator may intervene to focus and clarify.

Debrief on the process [3 minutes]

1. The facilitator will ask the presenter about the experience of using the Tuning Protocol (e.g., *How was the experience of presenting your teaching practice and its challenges?; Was the outcome of this tuning protocol different than other types of group discussion?; What did you think when we asked you to turn your chair away and listen silently?*).
2. The facilitator then debriefs with the participants (e.g., *How did the experience feel from your perspective as a participant?; Did anything the presenter say surprise you?; Have you learnt anything beneficial for your own teaching practice?*).

3. Reflection through personal experience –

   Completing a Zones Pie Chart (ZPC) was the main activity of the last CCG meeting. In this meeting, I asked my co-participants to identify and communicate their responses and feelings that arose after the application of a creative pedagogies framework to present environmental learning. We generated a chart from this activity; a mapping of shared vocabulary among my co-participants, specifically those aspects that challenged and distressed them during their praxis. As shown in

Figure 18 the zones pie chart consisted of three areas: comfort, risk, and danger zones.

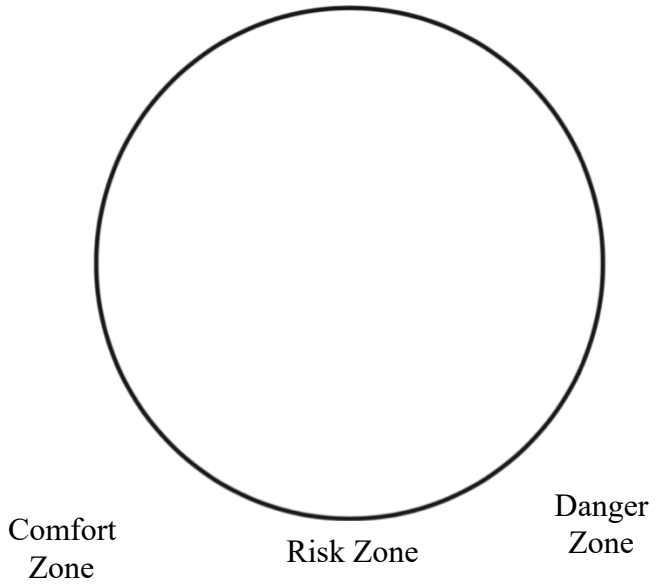


Figure 18 – Zones Pie Chart (National School Reform Faculty, 2014)

I asked my co-participants to reflect on their praxis and group their feelings into the zone that best represented them. First, in the comfort zone, my co-participants felt relaxed. They experienced no tension because they had a good understanding of what needed to be done during their practice. Second, in the risk zone, my co-participants felt nervous. Slight to moderate stress influenced them but they were still willing to take the risk. Personal learning and development are associated with this zone. Third, in the danger zone, my co-participants identified parts of a plan, act & observe, or reflect framework, which triggered 'powerful defensiveness, fears, alarm, and a strong desire to avoid or escape' (National School Reform Faculty, 2014).

The utilisation of multiple data gathering techniques helped me in understanding, scaffolding, and developing new lines of research inquiries (Miles et al., 2014). I summarised and justified the data gathered from various methods and procedures in these three research phases in Table 5.

Table 5 – A summary of methods and procedures for gathering data

Data collection phase	Position within the CPAR design	Methods	Tools	List of Participants	Data that is gathered	Justification
I Introductory workshop on creative pedagogies (CP)	Commencement activity of the CPAR process (*plan)*	A semi-structured interview	Interview guide, field journal, notes, and a video recorder	3 ITE educators	Notes and transcripts of video footage	Enables initial analysis of the sample in educational research (Brenner, 2006; Powney & Watts, 2018)
II Praxis of creative pedagogies (CP)	Main activity of the CPAR process (*act and observe*)	Fifteen class observations, lesson plans collection, and collection of emoji stickers from PSTs	Observation sheets, field journal, and a video recorder	3 ITE educators and 5 classes of PSTs	Observation notes, lesson plans, transcripts of video footage, photographs, and emoji votes	Adds 'corroborating evidence' to the effectiveness of CP praxis from an etic perspective (Yin, 2006)
						Provides a picture of social interaction (Erickson, 2006; Rex et al., 2006)
III Creative Collegial Group (CCG) monthly meetings	Conclusion activity of the CPAR process (*reflect and re-plan*)	Two reflective group discussions	Reflective group discussion guide, field journal, notes, and a video recorder	3 ITE educators	Notes and transcripts of video footage	Comprehends development of CP praxis, perceived barriers, and ways to overcome challenges through a non-threatening ambience (Nel et al., 2015; Valerie, 1997)
		Survey	An electronic open-ended questionnaire	46 PSTs	Responses	Describes perceived praxis of CP (Berends, 2006)

Ensuring Ethical Procedures Within the Spiral Self-reflective Cycles of Creative Pedagogies

I sought to provide ethical procedures for my co-participants' involvement. In this sub-section, I highlight several potential ethical issues and their mitigations.

The first ethical issue that I predicted was related to my co-participants' disclosure of specific and essential information about their teaching practice during CCG meetings, which could potentially trigger discomfort for the speaker and for other co-participants. I managed this risk by establishing an agreement prior to the reflective group

discussion, where I gained my co-participants' commitment to respect confidentiality and to create a safe, non-judgmental environment for all participants to take risks while exploring creative pedagogies.

The second ethical issue was how participation is vulnerable to distortion by power, reputation, and status (Kemmis et al., 2014). In this case, those without power, reputation, and status were more hesitant in sharing their experiences. One mitigation that I conducted was to encourage my co-participants with power, reputation, and status (e.g., Reka was a 20+ years highly experienced professor whereas the other participants were much younger and less experienced) to apply diplomatic strategies. This is in line with principles of justice, avoiding harm, respecting persons, and beneficence, which are always protected in this research (The National Health and Medical Research Council et al., 2007). Another mitigating step that I took was proposing the application of various approaches such as tuning protocol and pie chart zones during discussions. These activities helped achieve collective aims within the time constraints and encouraged the group to remain focused. Furthermore, I designed these activities to ensure ethical research procedures namely (1) to promote self-expression, whole-participation, and transparency, (2) to diminish gaps of status among co-participants, and (3) to build mutual trust and vulnerability (Kemmis et al., 2014).

The third ethical issue that emerged was minor psychological risks due to changes and re-planning within the spiral self-reflective cycles. Kemmis et al. (2014) reminds us that activities in CPAR projects often progress in a less structured way. It was therefore important to pause for a while, accept changes, and discover what impacts occur. Any convenient and inconvenient process needed to be celebrated in the communicative space to support my co-participants to 'make their practices and the consequences of their practices more *educational*, as well as more rational and reasonable, more productive and sustainable, and more just and inclusive' (p. 113).

Through management of these identified low risks, I believe the potential research contribution to the general body of knowledge, and the benefits to both co-participants and PSTs, would potentially outweigh any possible psychological risks.

Issues in Data Gathering

The Indonesian university long break was an issue that hampered my data gathering process, as this research was conducted in the academic semester during which this long break takes place. This break acknowledges the Indonesian national holidays, as well as providing a space for the university to conduct graduation and *dies natalis* (the anniversary of the university) celebrations. This session break impacted the timing of classroom observations and monthly CCG meetings, and required the arrangement of all dates for classroom observations and monthly CCG meetings be confirmed during the introductory workshop on creative pedagogies. We also discussed strategies to resolve this matter and I sent reminder messages and follow-up messages through a WhatsApp group to maintain my co-participants' interest and engagement outside of session.

Data Analysis

If you bend a single stick of the coconut palm, it will easily break, yet, it is difficult to bend the collection of sticks that make up a *sampat lidi*. Just my multiple data gathering methods, the strength of the stick bundle in a *sampat lidi* illustrates the interwoven might of data analysis approaches in this research. Three methods of data analysis are chosen and combined to ensure the strength of the research findings.

I analysed data in this research following guidelines proposed by Miles et al. (2014) to address the primary research question: *How do ITE educators use creative pedagogies to support the establishment of transformative environmental learning in an Indonesian initial teacher education program?* As suggested by Miles et al. (2014), I implemented the data analysis procedure concurrently to the data gathering process. This technique allowed me to consider what next data collection step would be necessary to enrich my existing data or to generate new data. I planned three methods of data analysis for this research: undertaking two cycles of coding, designing a conceptually clustered matrix, and confirming findings. I detailed these methods in the following sub-sections.

Identifying Themes in the Data: Two Cycles of Coding (From Codes to Pattern)

Coding is a process of organising or identifying notations to gain easier access to data when writing up research findings (Merriam, 2014). In this research, I coded the

qualitative data of transcripts and notes yielded from the introductory workshop, CCG meetings, and class observations across two cycles.

In the first cycle of data coding, I assigned initial codes to identifiable data units. I undertook initial coding during the transcription process with reference to research observations to 'generate insights and hunches about what is going on' in the data (Merriam, 2014, p. 174). Initial coding allowed me to proceed between an emerging analysis and the raw data during the process of categorising and theming. In a second cycle of coding, I deliberately split codes generated in the first cycle into a smaller number of analytic units, namely categories, causes, relationships, or theoretical constructs (Miles et al., 2014). The second cycle helped me build a cognitive network to comprehend common threads or differences among co-participants' accounts. I mapped the emergent patterns to learn how components of my findings interconnected. Another strategy that I used to strengthen mapping was jottings. Jottings aim to elicit reflective and analytic remarks for establishing a more condensed and coherent set of explanations (Miles et al., 2014). On completing mapping and jottings, the data was ready to be presented systematically.

Designing a Conceptually Clustered Matrix

The next analysis step was displaying the data as analytic units in a conceptually clustered matrix. Miles et al. (2014) describes a conceptually clustered matrix consisting of 'rows and columns arranged to bring together major roles, research subtopics, variables, concepts, and/or themes for at-a-glance summative documentation and analysis' (p. 168). By designing a conceptually clustered matrix, an outlook of a full data set is at one's disposal. Moreover, the conceptually clustered matrix allows comparison and contrast of data across co-participants to answer my primary research question.

I composed row headings (see Table 6) of the matrix deductively from various concepts of creative pedagogies and environmental learning (Craft, 2015a, 2015b; Craft & Jeffrey, 2015; Harris, 2017; Harris, 2016; Inwood, 2013; Jeffrey, 2006; Lin, 2011, 2014; Lucas, 2016; Rickinson, 2006; Rickinson et al., 2009; Rousell et al., 2018; Sale,

2015; Sterling, 2009). Inductively, I also inserted emerging themes in the data coding cycles in these row headings. Both the concepts and emerging themes were evaluative descriptors of my co-participants' creative pedagogy praxis. On the other hand, I created a column heading of the matrix to provide a thumbnail profile of each co-participant, including their pseudonym and the courses they taught. Finally, this format lent itself to illustrating how themes between co-participants could be analysed further. I present the conceptually clustered matrix proposed in this research in Table 6.

Table 6 – The conceptually clustered matrix proposed in the research

		Co-participant (1)	**Co-participant (2)**	**Co-participant (3)**
		Course Name	**Course Name**	**Course Name**
Creative Teaching	Posing problems/cases			
	Presenting and evaluating divergent thinking exercises			
	Yielding and evaluating synthesis from PSTs			
Teaching for Creativity	Exploring & awarding PSTs' curiosity			
	Building PSTs' persistence			
	Designing learning where creativity is demonstrated in class or outside of class time			
Creative Learning	Performing reflective action in the class			
	Providing sequence of learning activities from a variety of sources and perspectives			
	Providing PSTs with meaningful learning for their immediate needs and interests			
Presenting Environmental Learning in Some Respects	Cognitive dimension			
	Respons-ibility			
	Co-rrespondence			
PSTs' emoji stickers				

Following two cycles of coding and matrix designing, I then developed a representation of emergent elements of Lin's creative pedagogy framework found within my co-participants' praxis in a form of a 'mandala' (Figure 19). The word 'mandala' means circle in Sanskrit, and is commonly used to as a tool to accompany meditation. In Balinese Hindu communities, the mandala is further translated into *Tri Mandala* (a spatial concept of sacred–profane zones within Balinese traditional architectures – for instance houses and temples – that divides space among personal, social, and sacred activities) and *Sanga Mandala* (nine cardinal directions along with nine gods of directions). This traditional concept inspired me to draw a mandala that

can support any educator; a guide to be repeatedly revisited in visualising creative pedagogies for environmental learning. This mandala serves my creative purpose of expressing a wholeness of creative pedagogies implemented by my co-participants, that extends beyond and within various subjects they taught. My mandala does not only cover major findings of this research inquiry, it also has the potential to extend the significance of my qualitative research to 'produce different knowledge and produce knowledge differently' (p. 635), situating it in the generative third space between (1) creativity and environmental learning, and (2) indigenous and Western knowledge (Lather, 2013). In Chapter 4 I will highlight features of my mandala that significantly help me in answering my research questions. These features are nuanced elements of teaching for creativity, creative teaching, and creative learning that emerged within my co-participants' classes.

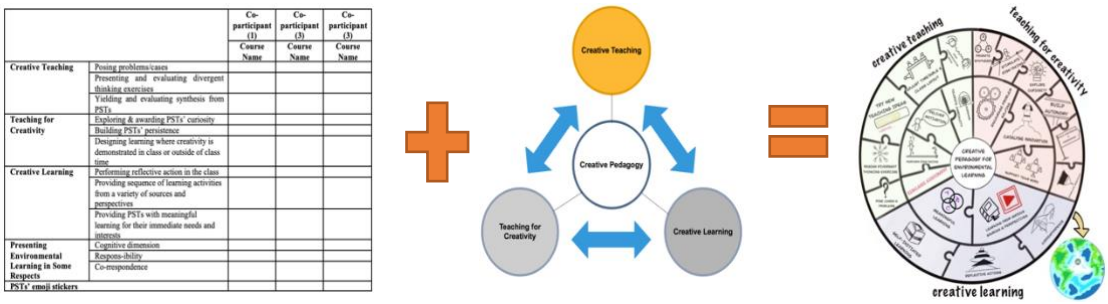


Figure 19 – A visual summary of the data analysis process within my inquiry: from Lin's creative pedagogy framework to a mandala of creative pedagogies for environmental learning

Confirming the Quality of Findings

Mertens (2015) outlines five criteria for judging the quality of qualitative inquiry, namely credibility, transferability, dependability, confirmability, and transformative validity, which are 'parallel to the criteria for judging positivist, quantitative research' (p. 268). Among these criteria, I sought to achieve quality findings of research through the three most appropriate criteria for qualitative research: confirmability (parallels objectivity), credibility (parallels internal validity), and transformative validity (authenticity to provide a balanced and fair understanding across multicultural context) (Mertens, 2015; Miles et al., 2014). In this sub-section, I elaborated potential interpretation issues (e.g., personal bias and holistic fallacy)

and strategies to strengthen the data interpretations and findings of my inquiry in the pursuit of Mertens and Miles et al.'s three criteria of quality findings.

Personal bias is the researcher's personal disposition and goals that potentially skew the ability to present the data analysis trustworthily (Miles et al., 2014). Since I carried out this research with an insider perspective, I acknowledged a potential for personal bias, lack of distance and lack of objectivity (Smith, 2012). I chose a confirmability audit as a strategic decision to solve this issue. This type of audit sought to confirm that I did not fabricate the data or their interpretation (Mertens, 2015). My confirmability audit involved tracking data to their sources and ensuring logics of data interpretation were explicitly stated. I also acknowledged the degree of my bias for the sake of research transformation. By unfolding the bias, I demonstrated that I was aware of an incomplete value embodied in my research, and hence, my research required challenges or further inquiry from readers to extend its contribution to society.

Another potential issue that I encountered was holistic fallacy. Miles et al. (2014) describe holistic fallacy as 'interpreting events as more patterned and congruent than they really are' (p. 289). Holistic fallacy can be tackled by including member checks and peer debriefing. To establish the credibility of my research, I translated member checks into getting feedback from my co-participants during, and after, data collection. The feedback was in forms of comments on summary findings, evaluation on accuracy of causal networks, and verification of the researcher's predictions (Miles et al., 2014). In the meantime, peer debriefing involved working with other people to examine the data analysis, research findings, and conclusions (Mertens, 2015). In this research project, I used the term *critical friends checks* to parallel the concept of peer debriefing. I contacted several critical friends to read a transcript and set themes of it. I then sought similarities between the themes they generated and my themes. From this I yielded some verifications of data analysis and research findings.

The involvement of co-participants in this CPAR project warranted the third criteria sought by my research: transformative criteria of validity. The collaboration between the researcher and co-participants in this research aims to make a realistic difference in

the university. My co-participants and I identified and discussed transformation that happened during my research project in our CCG meetings. In the end, I expected that my research findings would eventually contribute to the wider society.

Chapter Summary

In this chapter, I explored the philosophical background, inquiry, and design of my research. Situated within interpretivist and transformative paradigms, my research is designed as critical participatory action research (CPAR). This design offers flexibility and openness for the small group of ITE educators I worked with to design, implement, and reflect on their creative pedagogy praxis for environmental learning. The data in this research were collected through three different phases (plan, act and observe, and reflect and replan). Findings were then categorised into several themes, in which interpretation took place accordingly. A confirmability audit and peer debriefing were applied to verify those interpretations. I will discuss the findings and interpretations in the next chapter.

CHAPTER 4: FINDINGS AND INTERPRETATIONS

Metaphorical concepts that guide this chapter

Tumpek Landep

Cleansing ceremony

Tumpek Landep is a ceremony that falls on the second Saturday of the 210-day Balinese *Pawukon* calendar (*Saniscara Kliwon* on *Landep* week). On this day, Balinese people make offerings to thank *Sang Hyang Pasupati* (a god's manifestation) for creating, maintaining, and blessing important metal tools. In praise and prayer, the Balinese people put forward offerings to their metal heirlooms, for instance, *keris* (a wavy serpentine-shaped blade dagger). *Tumpek* means 'close to' and *Landep* means 'sharp'. As implied etymologically, the Balinese people celebrate their transformative journey of becoming sharp thinkers – sharp as a *keris* – through a lifelong, and balanced, sharpening of thought dimensions: *manah* (consciousness), *buddhi* (intellect), and *ahamkara* (a sense of identity). In Western worldviews, transformative environmental learning places an emphasis on the vital role played by the learners' frame of reference (cognitive, social, moral, and affective components) in identifying and re-evaluating their presuppositions and actions towards their environment (Boström et al., 2018). Meanwhile, in the Balinese spiritual-cultural philosophy of the sharp thinker within *Tumpek Landep*, transformation occurs as the three mind dimensions are harnessed.

The Balinese people celebrate the philosophy of cosmology and sharp thinkers through rituals and traditional ceremonies, which suggests that these philosophies are deeply enmeshed in the worlds of the ITE educators I worked with. Figure 20 represents how environmental learning has been reconceptualised by a group of ITE educators based on Balinese cosmology on the interconnectedness between human (the little universe/micro-cosmos/*Bhuana Alit*) and the universe (macro-cosmos/*Bhuana Agung*). The smaller cosmology circle in Figure 20 was explored in Chapter 2 and shown in

Figure 6. This finding resonates with Gearon's (1997) concept of the natural environment acting as a significant component of spiritual geography in Hindu cosmology, which is noted in the context of the endless universe and human creation. Within the philosophy of *Bhuana Alit* and *Bhuana Agung*, Balinese people believe in the equality of all souls (human, plants, and animals) as they are made of, and eventually merge with, the same elements of the universe. These elements are known as *Panca Maha Bhuta* and represent solid, liquid, air, light, and ether. This philosophy highlights the importance of human beings adjusting, harmonising, and balancing their acts to conserve the universe, including other little universes (animals and plants). Balinese spiritual and ritual practice is a decoding of this philosophy into everyday life.

Geertz (2008) discusses the application of Balinese rituals as indicative of a creative and reflexive adaptation to global challenges. Thus, the *Tumpek Landep* ceremony now includes the presentation of offerings to cars, motorbikes, and computers. Rituals are vital for the Balinese people because they provide deep cosmological perspectives that allow the Balinese to practise a self-critical discourse to address modern challenges, such as ecological degradation (Hornbacher, 2013). In this instance, climate change is perceived as a moral crisis caused by contradictions of modernisation (materialism and human greed) rather than a political issue (Hornbacher, 2021). It indicates that Balinese cosmological knowledge and practice constitutes a form of agency within the dominant narratives of globalisation, while also providing a rationale for the assimilation of, and resistance to, Western perspectives (Hornbacher, 2013). These factors inspired me to draw a person in the centre of Figure 20. This person illustrates every single individual's profound interdependence with nature and its extraordinary range of life forms. My drawing also depicts how humans inevitably bear the responsibility for nature's continuity as they are in a strategic position to re-evaluate their own roles, meanings, and practices. In Balinese indigenous ways of knowing, this re-evaluation process involves activation of consciousness (*manah*), stimulation of awareness (*buddhi*), and the development of a sense of identity (*ahamkara*). This Balinese process of re-evaluation, explained in detail in Chapter 2, is represented by the nested and intersecting circles shown within the person in Figure 20. The Balinese worldviews illustrated in this figure guide me in considering the philosophy of sharp thinking and

re-evaluation of knowing explored through this study in the first section of this finding chapter, as discovered through my co-participants' environmental learning.

Figure 20 – The emerging concept of macro-cosmos and micro-cosmos found within my co-participants' and the PSTs' environmental learning

In the second section, I present the participatory action research process used to introduce creative pedagogies for environmental learning to a small group of ITE educators. I categorised the findings from this process into themes that address my first sub-question (*In what ways do creative pedagogies develop teacher educators' capacities to scaffold environmental learning in an Indonesian teacher education program?*) and second sub-question (*What are the barriers and strategies to building effective creative pedagogies for environmental learning in an Indonesian teacher education program?*). I explored the creativity and environmental learning perspectives, expectations, and experiences of the ITE educators involved in my research. As will be

recalled from Chapter 3, the analysis sought recurring patterns that emerged from the data, which enabled me to group the data into themes.

In the third section of this finding chapter, I will focus on my co-participants' praxis of creative pedagogies for environmental learning, which demonstrates how they manifest their Balinese identity, including the ITE educators' endeavours in facilitating the PSTs' 'sharp thinking' through creativity. This section addresses my primary research question (*How do ITE educators use creative pedagogies to support the establishment of transformative environmental learning in an Indonesian initial teacher education program?*). The fourth, fifth and sixth sections discuss in detail the features within my mandala of creative pedagogies, where the third sub-question (*How do creative pedagogies bring indigenous knowledge and practice to the foreground of environmental learning in an Indonesian teacher education program?*) will be addressed. Approaches taken by my co-participants to deal with pedagogical complexities, and records of responses from the PSTs, will be described in the seventh section.

Part A: Supporting ITE Educators to Engage Creative Pedagogies with Environmental Learning

I now move to unpack my co-participants' views and experiences on environmental learning. This section considers the ways in which I worked with the co-participants in the initial stages of exploring their thinking and knowing about creativity, creative pedagogies, and environmental learning.

ITE Initial Perceptions of Creativity in the Biology Education Study Program

Working with my co-participants, we approached creative pedagogies through an adaptation of Brown's (2008) design thinking, which consists of three main stages: inspiration, ideation, and implementation (see methods in Chapter 3). In this section, I report on findings of inspiration and ideation sourced during an introductory workshop on creative pedagogies. The introductory workshop entailed a full day of structured explorations of creativity and environmental learning, which enabled the participants to deeply interrogate their experiences with these two subjects. In keeping with design

thinking, the workshop activities included ideations for the co-participants' teaching plans, which were later implemented, observed, and evaluated.

Our journey to conceptualising creative pedagogies for transformative environmental learning began with a brainwriting activity. This activity addressed creativity in the context of a biology education study program at the participating university. In this inspiration and ideation session, a group of ITE educators (Aya, Reka, and Ryan) shared their viewpoints about PSTs' creativity, and their expectations regarding creativity, such as product generation, imagination, and collaboration. We worked together to explore these aspects and to recognise opportunities, and gaps, for enhancing our own creative ideation and expression before attempting to cultivate creativity in PSTs through pedagogy, as suggested by Beghetto (2009) and Mullet et al. (2016). According to Beghetto (2009) and Mullet et al. (2016), gaps identified at face value will open opportunities to consider alternatives, combine various ideas, and learn which strategies can best be applied to facilitate creativity in classes.

For Aya, generating products was a quality ascribed to creativity, which accords with art products as an essential component of creativity (see also Busse et al., 1986; Runco & Johnson, 2002; Tan, 2001). Aya initiated a pop-up book project in the entrepreneurship course last year and would like to modify strategies for the project this year. Although Aya had limited hands-on experience creating a pop-up book, she stated that tutorial videos from YouTube appeared adequate for assisting the PSTs to complete this project. Aya was not confident in her ability to design pop-up books, although she was keen to elicit creative learning outcomes from the students. Aya's view is represented by the comments: 'We are exploring ways to develop pop-up books from YouTube videos. Maybe if I try making a pop-up book the result will not be as good as what people produced in those videos.' Aya's statement is consistent with Jackson's (2006) and Philip's (2018) presupposition about educators' lack of confidence in developing and incorporating creativity in their classes, despite a growing number of pedagogical support being available. Beghetto (2009) states that this phenomenon may create a tendency to dismiss creative potential within one's classroom as it is uncomfortable to venture into an area of creativity one feels unsure about. Contrary to

Beghetto (2009), although Aya lacked confidence about her creative potential, she demonstrated her intention and preparedness to step into a pedagogy of uncertainty in a willingness to enrich the creative learning experience of her students.

Another co-participant, Reka, stated that creativity comprises communication and collaboration to stimulate generative thinking. He mentioned using deep learning tasks to stimulate the PSTs' creativity, to guide them, and to challenge the PSTs to achieve learning outcomes. Fullan and Langworthy (2014) define deep learning tasks as learning partnerships where students share leadership in 'discovering and mastering existing knowledge and then creating and using new knowledge' (p. 21). Reka identified deep learning tasks as those that placed a high demand on PSTs to maintain self-discipline, confidence, and engagement in learning. For example, he stated:

> I tried to build creativity through collaboration in deep learning to explore PSTs creativity. Jigsaw technique is my favourite tool. I believe that the innovation resulted from deep learning will appear on the PSTs' responses in their reflective assignment. I also used deep learning instruction for midterm and final exams, where the PSTs evaluate and compose a paper. (Reka)

Ryan, on the other hand, considered creativity as a way of thinking and a part of cognition. Ryan's view on creative cognition resonated with the concept of cognitive processes, such as goal-directed thought, which assists with the production of original ideas, as well as practical and workable ideas, as asserted by Amabile (1998), Beaty et al.'s (2016) and Ward's (2007). His commentary also suggests similar perceptions of incremental creativity to an earlier work by Shao et al. (2019), where creativity is viewed as problem re-definition outcomes. Ryan further indicated that he usually combined minds-on and hands-on activities in his classes to stimulate the PSTs' creative thinking, as signalled by the comments:

> In most classes that I taught, I usually described the word 'creativity' to my students. Creativity is a part of thinking, and thus the first thing that I need to change is the PSTs' mindset. Creativity is a system of thinking that combines ideas, or generates something new, which might be original or blended, transforming existing ideas into something new. I have provided diverse activities to stimulate the PSTs' creativity, from minds-on to hands-on activities. I learnt that I would be able to develop the PSTs' creativity in my classes when I implemented inductive approaches. We rather started with cases than theories. (Ryan)

Ryan was a keen supporter of using digital learning media to spark creativity in his classes. He believed that new media was a pivotal element to teaching and learning, in accordance with the notion of using instructional media to fuel learners for the re-creation of new narratives within higher education programs, as suggested by Walker and Gleaves (2008). Ryan referred to digital storytelling as a way of showcasing the PSTs' creativity in his commentary: 'I assign my students tasks to show creativity in video production, such as the digital storytelling project. I also teach with Photoshop. The PSTs can express themselves by using Photoshop to create a poster for an international conference.'

It was evident that each of the ITE educators I worked with valued creativity differently, which aligned with Taylor and Gantz (1969) categorisations of creativity as productive skill, innovative flexibility, and inventive ingenuity. Aya echoed creativity as 'productive skill', in which individuals combine their knowledge and skills to implement new ideas or techniques for craftsmanship, with production as a desirable attribute. Reka viewed creativity as 'innovative flexibility' involving appropriate alteration and adaptation of abstract ideas to potentially transform his learning environment. Ryan described creativity as 'inventive ingenuity' aimed at problem solving and discovering new relationships. The co-participants also demonstrated that they had embraced the concept of creative practice, with PSTs invited to control and take ownership of their learning through various projects, as explained by Craft and Jeffrey (2015). These findings show an absence of creative divines or traditional mythologies as influences on my co-participants' views of creativity. This suggests rather different factors shaping creativity to those mentioned in earlier works by Glăveanu and Kaufman (2019), despite my co-participants' dominating ritualised spiritual life.

Further brainwriting activities in the introductory workshop activity revealed the co-participants' previous creative endeavours in relation to pedagogy in the biology study program. I called these creative endeavours 'creative practices' to establish a common ground of collegiality and collaboration between co-participants, as recommended by Craft and Jeffrey (2015). This term was used to encompass all practitioners' creative

endeavours, including senior academics, new academics, and assistant professors involved in my research. My findings suggest that the creative practices of co-participants were sequential; they were situated across lesson planning, teaching and assessment. These creative practices are mapped into a matrix (Table 7) that was generated from the second brainwriting activity and other informal conversations during the CPAR.

Table 7 – The clustered matrix of the co-participants' creative practices

Creative Practice Categories	Aya	Ryan	Reka
Incorporating educational philosophies	1. Constructivism	1. Technological pedagogical content knowledge (TPACK)	1. Technological pedagogical content knowledge (TPACK) 2. Local wisdom based & cross-cultural teaching and learning 3. Spirituality 4. New ecological paradigm (NEP)
Modifying teaching technique(s)	1. Cooperative learning 2. Problem- and project-based learning	1. Problem- and project-based learning	1. Problem- and project-based learning 2. Jigsaw 3. Think, Pair, and Share
Using instructional media	1. YouTube tutorials 2. Realia (objects or materials from everyday life used as teaching aids)	1. Motivational, cartoons and flash videos 2. Learning Management System (LMS) 3. Self-created tutorials/DIY tutorials 4. Realia 5. Fun abbreviations	1. Self-created games 2. Learning Management System (LMS)
Designing project(s) for PSTs	1. PechaKucha presentations 2. Pop-up books 3. 3D models/dummies	1. Leaflet 2. Poster 3. Blog	1. Community-based participatory research
Using communication strategies	The pronoun 'we' while teaching	The pronoun 'we' while teaching	The pronoun 'we' while teaching
Using reflective strategies	Self-reflection and in-class group reflection	Self-reflection and in-class group reflection	Self-reflection and in-class group reflection
Assessing and evaluating	1. Invited PSTs to do peer-assessment and evaluation 2. Constructed rubrics, checklist, and quiz	1. Invited PSTs to contribute to designing quizzes 2. Constructed rubrics and evaluation sheets on LMS	1. Invited PSTs to do peer- and self-assessment 2. Constructed rubrics and peer-evaluation sheets on LMS

As can be seen in the mapping of ITE educators' creative practices (Table 7), Aya located PSTs as active learners who constructed knowledge and scaffolded meaning-making through personal experiences, which aligns with Merriam et al.'s (2012) conceptualisation of learning in adulthood. Aya further applied strategies to stimulate the PSTs' self-directed learning (e.g., problem-based, project-based, and cooperative learning). Such strategies are identified by Morris (2020) for potentially generating creative learning outcomes, while according to Aya, self-directed learning strategies could enhance the PSTs' understanding of cultural and ethnic diversity. Aya emphasised the importance of these strategies as the PSTs came from the various islands of Indonesia.

Ryan's creative practice consisted of three stages – knowledge acquisition, implementation and reflective refinement, and creation – which echoes constructivist perspectives, as described by Chai (2019). In his creative practice, technology was instrumental in building subject matter knowledge, which resonates with Muhaimin et al.'s (2019) findings on the importance of TPACK for Indonesian science educators in stimulating PSTs' autonomy and joyful learning.

Reka has been implementing TPACK, and articulating the intersection of sustainability and pedagogy for science inquiry, for the last decade. His creative practices are influenced by local wisdom-based, and cross-cultural, teaching and learning. Reka has been recently including spirituality in an attempt to provide a more holistic teaching, where he invites the PSTs to build their knowledge while reflecting on, and being aware of, their inner selves through journal writing. Reka's teaching focus on spirituality resonates with Zhang and Wu's (2016) recognition of the importance of personal and spiritual development during teacher training. Sheffield et al. (2015) note that the combination of these approaches potentially assists PSTs in exploring a wide range of problems, from science, sustainability, and technology, to community. In this respect, Reka scaffolded not only the PSTs' cultural worldviews, but also his own, about a local natural ecology, namely a *subak cultural landscape* (SCL) – a Balinese ancient cooperative farming practice – through several modified learning strategies. He also presented Balinese spiritual perspectives to encourage active participation in their

environment through community-based participatory research. This is consistent with Bone's (2016) characterisation of deep ecology, which aims to promote specific values, such as all life forms having a specific contribution to the universe.

ITE Educators' Views and Experiences on Environmental Learning

In a segment of our introductory workshop (data gathering Phase I, detailed in Chapter 3), we discussed De Bono's (2000) imaginary hats. My co-participants believe this theory supports the planning of environmental learning. In this activity, my co-participants explored their frame of reference to provide a basis of analysis for their environmental learning design. During this activity, Reka elaborated that he referred to his culture only after his understanding about environmental learning had been well-shaped by Western viewpoints:

> Mitha: Ah, you only chose one hat, the black hat. Why is that?
> Reka: I usually start my teaching by pointing out problems, the social gaps, for example, from pollution to landslide to bio-culture. Bio-culture is an extremely important subject in this case. All these years, we have always been adopting the Western world's environmental learning, that is ecology. Meanwhile, we have another learning dimension, known as spirituality, which is constructed from ritual and religion. I see spirituality as our 'main building block' in environmental learning, but it has been slowly forgotten. For example, why is one breed of duck in Bali called a different name and treated differently from another? What does it have to do with our ritual and religion? What will happen if language diversity in this bio-culture dies? These questions are worth asking.

Reka's description of introducing what he termed 'bio-culture', the enmeshing of Balinese cultural connections with elements of the local biology, gives both socio-cultural and bio-physical environments a prominence in environmental learning. It is an encouraging sign of a scaffolding of environmental learning, particularly to shift the presentation of general facts about the environment with the development of learners' capacities to critically explore their native biodiversity. Reka's perspective locates environmental learning at the heart of the Balinese community to sustain certain collective knowledge. This perspective resonates with arguments presented by Hornbacher (2013) about the collective stance displayed in a Balinese worldview. As it was recalled in our introductory workshop, information about biodiversity, and its position in Balinese rituals, is limited in the literature. Reka stated that the information

was mainly grounded in the Balinese people's principles of *palemahan* (maintaining an amicable connection with animals and nature), where learning this traditional concept requires communication with cultural elders. Reka's ideation of environmental learning in this respect illustrated communal, informal, and holistic processes, which, according to Merriam and Kim (2008) and Merriam and Bierema (2013), are still scientific.

My field notes captured how Aya was unsure about incorporating environmental learning. At the beginning of our introductory workshop, she shook her head a few times and whispered to her colleagues. With support from, and discussion with, her peers during our introductory workshop, Aya acknowledged that she had assimilated a broader sense of environmental learning, as shown in her commentary: 'I was uncertain as I had a biased opinion on environmental learning. I thought it was going to be tricky to incorporate [this new learning] into the courses I taught. After our discussion, I concluded that we should show awareness toward our surroundings.' She eventually chose to take a risk by infusing environmental learning into courses she taught. Aya illustrated an eagerness, which Illeris (2013) characterised as an essential feature of transformative learning in mature adulthood. Aya was keen to prove to herself, and her colleagues, that she would be capable of taking on the task and achieving the goals that she previously had not had the chance to, as is evident from her comment:

> So, I chose a white hat as a starter. We need to observe and understand factual data first and then manage our thinking process by using a blue hat. After careful planning, we get into the execution, and we will be able to see what we might miss. With the weaknesses of our practice through the black hat, we will eventually be aware of our strengths and discover something new. That is how I will manage my environmental learning and I am confident that I can do it. (Aya)

My co-participants and I continued exploring visual imagery. I designed this activity to invite my co-participants to experience an 'aimless stroll', or dérive, as suggested by Hammond's (2017). Eight distinctive postcards were used as tools for purposeful wandering through my co-participants' environmental learning practice. Through this thinking process, the co-participants could reflect on the learning environments they organised to stimulate creative discovery. This activity also presented a transformative learning experience to my co-participants; combining cognitive and emotional processes through personal imagination to complete analytic, reflective, and rational dimensions (see also Clark, 1997; Dirkx, 1997, 2001; Kroth & Cranton, 2014; Mezirow, 2009). Imagination and emotions guide visual imagery to enable personal meaning-making through an examination of prior beliefs and values. In this research, visual imagery offers an alternative to imagery showing emotive negative environmental impacts, to facilitate perspective transformation in adult learning. Ryan explained that the visual imagery (Figure 21) had led him to personal enlightenment towards potentially transformative perspectives and endeavours: 'I positioned myself as a person who does not know much about environmental learning, and I need to relearn – even harder because now I am teaching it. I have to develop environmental awareness too, like this girl.'

Figure 21 – The visual imagery chosen by Ryan
Artist: Rebecca Jones Giclee

Meanwhile, Aya grounded her vignette (Figure 22) in her personal, instinctive, and emotive sense of experiences to understand social and environmental issues. This is consistent with transformative learning through the lens of mythos, which Dirkx (1997) elaborates as being 'learning through soul, giving voice to underlying myths that, when recognised, can illuminate aspects of our world not visible through the language of logos' (p. 81). Aya claimed: 'I saw a mum cuddling her kid, a comfy bed with a crown. I do not know. I feel like we are given all these natural resources. We need to change our ways of exploring the Earth and re-plant.'

Visual discrimination allowed Reka to state a desire for changing his previous position within his environmental learning. Reka chose a postcard (Figure 23) to share his feelings and signpost a critical self-reflection. This response reinforced the notion of feelings as a self-reflection starter, guiding Reka towards self-awareness, and stimulating change, as described by Taylor (2001). His exploration of triggered feelings included a desire for accommodating a more positive communication with his students:

> It seems that I am still seen as a centre, or want to be a spotlight and act as a spotlight, that students are living under my spotlight. I always remind my students about the littlest thing in my courses. Sometimes I want to be like Ryan, who treats our students as friends. (Reka)

Figure 22 – The visual imagery chosen by Aya
Artist: Anna Silivonchik

Figure 23 – The visual imagery chosen by Reka
Artist: Damien Florébert Cuypers

In the introductory workshop, I explicitly applied two elements of Lin's (2011) creative pedagogy framework – creative teaching and teaching for creativity – to both elicit the ITE educators' complex thinking and to model possibilities for their teaching ideations. As described by Lin (2014), creative pedagogy in this setting was a tool for building a dynamic between my co-participants and I, where new modes of thinking emerged for the re-conceptualisation of creativity and environmental learning. It was evident from the ITE educators' responses that creative pedagogies enabled deep explorations of creativity and environmental learning.

To continue the experience of a creative climate (Mumford & Gustafson, 1988; Radloff et al., 2019) in the workshop, we extended our discussion to include factors that contributed to pro-environmental behaviours through an adaptation of a story of a living forest by Siegel et al. (2018) (as detailed in Chapter 3). This activity was a practice of Hammond's (2017) 're-interpretive cultural practices' or détourne, as my co-participants illustrated a local living forest (my co-participants referred to the *subak* cultural landscape) and its reciprocally related tangible and intangible environment. This forest required physical properties (e.g., water, trees, birds, and temples) to converge with non-physical features (e.g., sunlight and air) for it to grow. My co-

participants agreed that physical attributes constituted tangible qualities only when non-physical elements supported them.

The ITE educators' stories of forest metaphor illustrated the complex interplay of factors that influence behaviours that are pro-environmental. They described a Balinese indigenous institution, *desa pekraman*, as a tree that produces food and nutrients for the forest inhabitants. *Desa pekraman* is a social-ecological system where traditional knowledge (bio-cultural approaches, linguistic diversity, and traditional ethnobotanical knowledge) is shared, and collective decisions made (Caneva et al., 2017; Creese, 2019; Sujarwo et al., 2019). Therefore, *desa pekraman* was considered to be a contributing organisation that could generate pro-environmental behaviour in the Balinese society.

Ryan mentioned that sunlight and air represented intangible values in the Balinese community. Energy from the sun and carbon dioxide from the air are essential for photosynthesis by plants, in order to produce food and oxygen for themselves and other organisms. In the context of nurturing pro-environmental behaviours in Ryan's discussion of the forest story metaphor, sunlight represented spirituality and air represented culture. Both spiritual and cultural practice are ingrained within the Balinese peoples' lifestyle, although they often do not realise it. Ryan believed that these practices help the Balinese community to experience and understand their world, complementing the Western knowledge they acrue from formal education institutions. This finding is consistent with Roth and Sedana's (2015) framing of the *subak* position as a local knowledge instrumental in advancing environmental awareness, especially in the Balinese tourism sector.

Having presented my co-participants' perspectives on creativity, environmental learning, and their previous pedagogical practices, I now explore the result of my discussion with the co-participants about the possibilities for repositioning environmental learning within this study program.

Identifying Complexities in Transforming Environmental Learning

In this section, I will recap challenges to creativity and environmental learning, as encountered by my co-participants during the brainwriting activity in the introductory workshop. This will allow me to answer my second sub-research question (*What are the barriers and strategies to building effective creative pedagogies for environmental learning in a small group of teacher educators?*). Identifying these barriers in the early stage of my research allows for the research to be informed of, and directed by, various factors that contribute to the planning and implementation of creative pedagogies for environmental learning in my co-participants' courses.

A major aspect that my co-participants highlighted was a complexity in incorporating creative practices from the social ecological model. The social ecological model delineates humans as active participants whose behaviours and attitudes are affected by the environmental circumstances they perceive and experience – for instance place and time (Shelton, 2018; Stokols, 2018). With reference to this model, Reka revealed two major challenges to developing PSTs' creativity:

> We have supporting facilities; however, they need to be optimised. Also, the society we live in can be an inhibitor. Then we talk about the wider environment, including regulation. How could we develop students' creativity if the teachers are targeted with particular learning outcomes within a short period of time? In this case, I see regulations are pivotal to reforming creativity in our education. (Reka)

Aya agreed with Reka's perspective of the social ecological factors impeding creativity in the PST program. In the meantime, she gave credit to Reka's endeavours to sharpen the creative skills of the PSTs. She also brought to the table an experience of discovering plagiarism in a PST's assignment. She indicated the PST's other responsibilities as an underlying reason for the plagiarised assignments:

> I personally believe that Reka has shaped the creativity in our study department by providing rich experiences from freshman to senior years. You will see how PSTs in their senior year are tremendously creative. Time and motivation come with both educators and PSTs. Most of our PSTs are part-time workers who often skip attending classes. Since they work, they have less time to develop their creativity compared to their peers who are full-time students. They do their assignments, maybe at the last minute. Sometimes I read assignments that are copied from a book, a source, or another student's work. For group works, they

> tend to be freeloaders (ones who do not complete their allocated tasks yet receive group marks). (Aya)

Meanwhile, Ryan chose to reflect on his personal hurdles before examining other contributing factors. He commented on the curriculum complexity in the department:

> I have got a little time developing myself to support PSTs in becoming more creative because there have been plenty of events held at this university. Again, I prefer looking inside to outside myself. I actually have routines to build my creativity but as there are many events in this university, sometimes impromptu, I find it difficult to develop my personal development. Second, it might be the curriculum. We need to hold a curriculum meeting that is specifically designed for embracing creativity in our study program. We can discuss ways to achieve creative learning outcomes. (Ryan)

Reka, Aya, and Ryan believed that pedagogy is a focal point for transforming environmental learning in Indonesia. From this perspective, our discussion turned to the possibility of redirecting the focus of their teaching of environmental learning. My co-participants stated that they would first aim to make accommodations to their teaching for environmental learning – what we called 'accommodative environmental learning' – because this was a more achievable goal in one semester compared to a complete transformation. The co-participants' statements align with Rickinson et al.'s (2009) suggested staged approach to environmental learning. Ryan, for example, explained that knowledge about sustainability needed to be introduced to stimulate a social movement on eco-friendly actions among the PSTs, as represented by the response: 'I'd love to introduce learning media promoting eco-friendly actions that potentially resolve local environmental issues. These issues can be presented as movements on social media. I believe that one's eco-friendly action will prompt another.' Ryan's response on promoting social media movements demonstrates an acquainting of himself to, and connection of his pedagogy with, the PSTs' inclinations and interests described by Csikszentmihalyi and Wolfe (2014). This would effectively support the PSTs feeling of ownership of the learning material.

Reka considered accommodative environmental learning as an essential step in learning about sustainability. Reka was ready to change his role from spoon-feeding to facilitating. Reka stated that he would add a different angle to his story of environmental learning by integrating diverse subject-matter areas, reflecting

Sternberg's (2019) view of a cross-fertilisation of contexts in learning to enhance students' creative ideas and insights. Reka accentuated the idea of breaking down subject barriers to integrate multiple disciplines through a sequence of inquiry-based activities in the local environment. Reka's pragmatic approach responds to a gap identified by Summers et al. (2005) about the absence of collaborative work within Education for Sustainability (ESD) curriculum. Reka intended to further demonstrate shared values and an holistic relationship between the place they live in, eco-science, and social arrangement, resonating with Luke's (2001) claim that educators are the specialists who could assist learners to decode natural patterns and interpret natural meanings within environmental education. Reka was determined to undertake local place-based inquiry, albeit unsure of how he could attain community involvement in his classes:

> I am going to focus on the first step (accommodation) but with a little addition. I will invite the students to see the ecosystem as an integral part between species and ecosystem diversity. This interconnectedness will help them to realise that biology is not alone. There is a link between concepts in biology they learn in the classroom with their traditional local concepts. I would like to integrate environmental learning with our social arrangement too, although I have not included society or community yet in this case. (Reka)

Given these perspectives, I found it helpful to conceptualise the 'what' of environmental learning that was denoted in my co-participants' classes. As stated earlier in this section, my co-participants unanimously indicated that they would focus on building accommodative environmental learning into their classes. In the following section, I will discuss the shift from perceptions and ideations to the implementation work in the CPAR. I will first unpack features of my key findings framework – my mandala of creative pedagogies – showing how my co-participants infused accommodative environmental learning into the courses they taught. Then, as the last feature of my mandala (co-rrespondence) I will highlight themes of environmental learning that are situated around local place-based inquiry.

Part B: Creative Pedagogies for Environmental Learning

I make daily *canang* offerings to thank *Sang Hyang Widhi Wasa* (the Supreme God) in Bali. *Canang* has become a quintessential token of our gratitude for the peace and

harmony within micro- and macro-cosmos (two harmonious cosmic systems as detailed in Chapter 2). The *canang* consists of a palm-leaf tray, colourful flowers, and other varied components. It requires one's consistent time and effort to craft. *Canang* illustrates the philosophy of a Bhagavad Gita sloka (A 700-verse scripture believed by Hindus to be the Song of God), which states that even the smallest form of devotion (e.g., a leaf, some fruit, and a drop of water) counts as long as it is offered with a sincere and genuine heart. In Bali's regions, *canang* have distinctive shapes, commonly rectangular, round, or triangular. Although *canang* is offered in various forms, as its Kawi (an old Javanese language that is mainly influenced by Sanskrit) etymology indicates, the word *canang* signifies one aim: a beautiful purpose. In this sub-chapter, *canang* is a metaphor that represents an intricate web of components in creative pedagogy, designed for the purpose of transformative environmental learning.

As elaborated in Chapter 2, Western creative pedagogy has been utilised in Indonesia for diverse learning interests, but less so in relation to environmental learning. I look to bridge this gap by addressing my primary research question in this chapter (*How do ITE educators use creative pedagogies to support the establishment of transformative environmental learning in an Indonesian initial teacher education program?*). I initially discuss the conceptualisation of creative pedagogies within two phases of this Critical Participatory Action Research: plan, and act and observe. Then, I propose further development of Lin's (2011) conceptual framework of creative pedagogy represented in a mandala: *the mandala of creative pedagogies for environmental learning*.

Unpacking the intertwined elements of the creative pedagogy mandala is like taking out the components of a *canang* (Figure 24). We may only see five different colours of flowers, yet, as we remove them, we soon find other essential elements that represent our micro- and macro-cosmos, such as a *sampian uras* (a decorative element made of cut and skewered young coconut leaves), a *porosan* (a betel leaf roll consisting of betel nuts, gambier, and lime), a slice of banana, a slice of sugarcane, and a piece of rice cracker. These components are unseen from the surface yet without them a *canang* would not form 'a beautiful purpose'.

Figure 24 – The canang from a bird's-eye view

Canang as a creative practice is conceived in relation to individual movements in Bali, where the knowledge of crafting *canang* are passed from person to person within particular social structures or communities of practice, such as family, schools, and local community groups. Ways of perceiving and modifying *canang* are 'meta-practices' (Kemmis & Grootenboer, 2008) that construct the conduct of other practices in the community, for example shaping aims and goals in a household about what flowers and fruits will be planted in their backyard as well as what gardening techniques will be learned. Just like the gardening practice, the development of a creative pedagogy mandala in this research has been established by the ITE co-participants meta-practices of Lin's (2011) creative pedagogies to present environmental learning. In this sub-section I briefly recap on how I generated a creative pedagogy mandala to represent a synthesis of the creative pedagogies the ITE educators made use of. After the first phase of the research activities – an introductory workshop on creative pedagogies – I conducted fifteen classroom observations from five different courses. This represented the second phase of the CPAR spiral self-reflective cycles (*act and observe*). The observation data was collected through structured reflections and impressions, recorded in an observation table with a set of pre-established criteria. These criteria were derived from relevant literature and factored in aspects of creative skills and capacities (Harris, 2017; Harris, 2016), creative teaching and learning (Jeffrey, 2006), and environmental learning (Rickinson et al., 2009) in the classroom (Appendix 1). Harris' core skills of creativity provide tangible demands to be practised by both ITE educators and PSTs in

enhancing creativity within units of teaching. This list clarifies attributes of creativity which are often considered vague. Jeffrey's creative teaching and learning characteristics inform varied opportunities to embrace in encouraging creative agency by ITE educators and learners. Rickinson et al.'s framework of environmental learning provides dimensions to explore learning processes as opposed to its outcomes. This relevant literature assisted me in generating a robust picture of how creative pedagogy and environmental learning should be enacted in classrooms.

I also gathered several other forms of data in this phase: field notes, transcripts of video footage, photographs, emoji votes, tasks, reflections, and questionnaire responses from the PSTs. To answer the primary research question (*How do ITE educators use creative pedagogies to support the establishment of transformative environmental learning in an Indonesian initial teacher education program?*), I undertook two cycles of data coding, designed a conceptually clustered matrix, and confirmed the quality of findings of this corroborating data as suggested by Miles et al. (2014). I approached this data analysis procedure concurrently with the classroom observations, refining the conceptually clustered matrix (Appendix 3). At the end of this process, I converted the clustered matrix into a mandala of creative pedagogy (Figure 25) to represent the detailed features of creative pedagogies my co-participants demonstrated in their teaching for environmental learning.

This research was my co-participants' first purposeful initiative of enacting creative pedagogies, although they had previously been encouraged by the university to prioritise the teaching of environmental sustainability. These unique circumstances created a space for trialling Lin's (2011) creative pedagogy. This theoretical basis for the inquiry offers opportunities for shifting modes of thinking in the teaching and learning spaces of ITE educators, within environmental contexts. For my co-participants, this third space is a productive middle ground that makes explaining cultural interaction between traditional and Western values possible, and allows for discussion on how possible changes can be promoted within this space, extending on Lin's (2014) purpose of designing creative pedagogy framework.

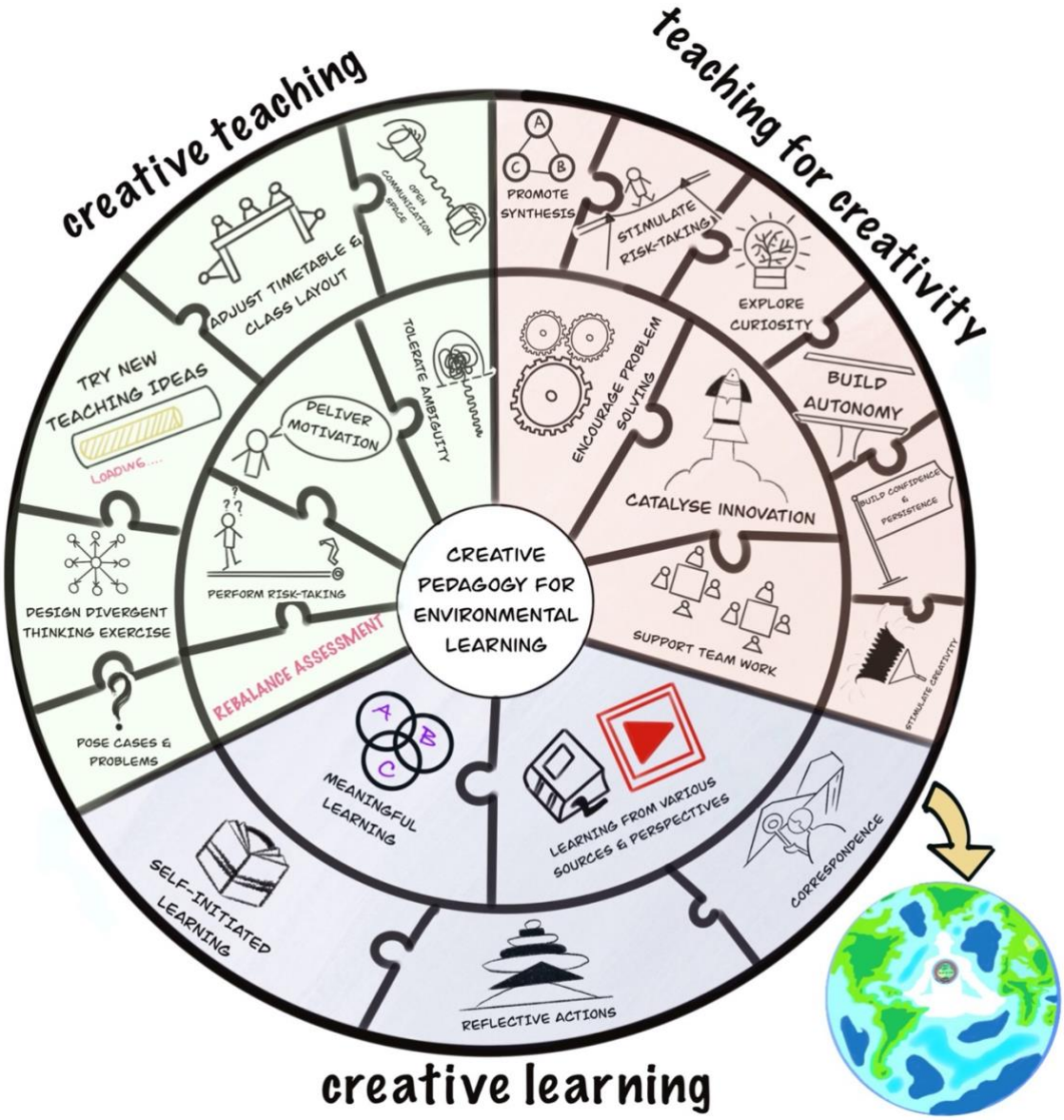


Figure 25 – The mandala of creative pedagogy

The resulting mandala of creative pedagogy (Figure 25) comprises Western ideals of creativity and environmental learning (adapted from Craft, 2015a, 2015b; Craft & Jeffrey, 2015; Harris, 2017; Harris, 2016; Inwood, 2013; Jeffrey, 2006; Lin, 2011, 2014; Lucas, 2016; Rickinson, 2006; Rickinson et al., 2009; Rousell et al., 2018; Sale, 2015), integrated with Sterling's (2009, p. 115) notion of a 'co-rrespondence' (a closer knowledge match with the real world) with Balinese traditional knowledge and perspective on micro- and macro-cosmos that became evident in my co-participants' classrooms. Considering Glăveanu's (2018) recommendation of locating creativity

beyond Western-based understandings, my study has no intention of testing or comparing Western and Eastern perspectives and standards of creativity in higher education. Building on that insight, I advance the discussion about creativity towards a more situated and local understanding and practice. I drew emic, or local understandings, of creativity within creative pedagogies enacted by my co-participants in respect to their cultural rights. Being an insider of the same cultural group lens, I related my co-participants' delivery of creative pedagogies for environmental learning to our Balinese life philosophies, understanding, and practices.

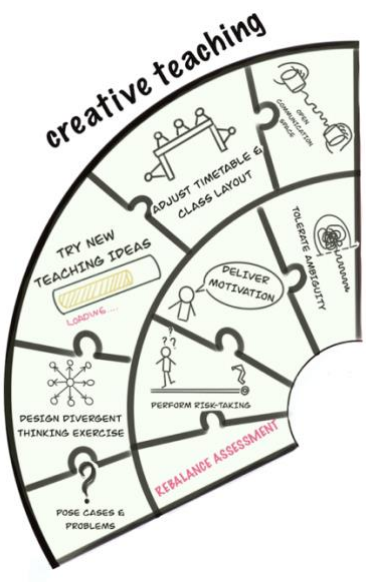
My mandala accounts for, and engages with, complex interconnections between the cultural and social aspects of life and learning ecosystems, including their emergent and unexpected processes. In this research, creative pedagogies were practised in an ITE context where Balinese indigenous knowledge was not made explicit in the curriculum. Learning sources and teaching guides were also not available for ITE educators. Being the first to experiment with teaching and learning in the intersection of creativity, environmental learning, and indigenous knowledge, my co-participants generated new practices that enabled opportunities for change and crisis at the same time. These dynamic interactions are illustrated as intertwined and non-linear processes in my mandala, covering various socio-ecological systems features such as resilience, adaptability, and transformability. In this inquiry, these socio-ecological systems features are recognised as inseparable components, reflecting what Biggs et al. (2021) refer to as 'complex adaptive systems', which inform ITE educators and PSTs' adaptations to their changing ecosystems, including knowledge and learning ecosystems. I then translated these 'macrolevel system properties' into 'microlevel entities' (Biggs et al., 2021) that assist future users to organise their creative pedagogies – these are represented as jigsaw pieces in the mandala. Although some of its features are highly context dependent, this mandala also has the adaptive capacities required to forge new changes in the three interrelated fields (creativity, environmental learning, and indigenous knowledge).

Drawing from an analysis of the research activities of various learning conditions, dialogic processes between the ITE educators and PSTs, and collegial conversation

among the ITE educators, my mandala builds a pedagogy framework that provides opportunities to learn strategies when faced with uncertainties, as recommended by Watkins and Mortimore (1999). Each of my mandala 'puzzle pieces' represents a creative feature of my co-participants' application of the interconnected elements in Lin's (2011) framework. First, the features of creative teaching reflect my co-participants' creativity and creative initiatives, which, according to Jackson (2006), are two contributions of educators that are rarely acknowledged and celebrated within public domains. Second, teaching for creativity involves higher-order learning strategies that could support the development of ecological consciousness for both educators and learners. Third, creative learning emphasises incremental creativity (see also Gilson & Madjar, 2011; Jarman, 2014; Shao et al., 2019) to alter or modify current learning approaches to revisit indigenous ways of knowing. As a self-teaching tool, this mandala is a potentially important support to teachers, lecturers, or ITE educators developing locally situated creative pedagogies, especially as its framework advances educators' ways of understanding a range of creative features, such as intuitive thinking, active learning, and collaboration.

In the following sections, I elaborate on, and provide data illustrations of, features of my mandala according to each element of Lin's (2011) creative pedagogy framework. This covers the following sections: (1) creative teaching; (2) teaching for creativity; and (3) creative learning. I give a brief overview of the mandala features, with a snapshot from the data that exemplifies that particular creative pedagogy element. The mandala is a summative product from my analysis and the snapshots are highlights that demonstrate the creative pedagogy elements in action. Although depicted as separate elements, many of these features occurred simultaneously – each element integrated and sequenced with other elements. For the purpose of spotlighting the different creative pedagogies in action through this research, I consider single elements at a time.

Creative Teaching



Creative teaching is defined in Chapter 2 as dynamic, imaginative, and innovative approaches that are used by educators in planning and enacting their lessons (Lin, 2012, 2014). My co-participants' creative teaching was similar to those that Mullet et al. (2016) define, comprising personal creativity, creative processes, and initiatives in building an enjoyable learning environment that inspire the PSTs and foster their creativity. Creative teaching within this mandala represents my co-participants' experiments with new ideas of teaching to provide the most advantageous ecosystem for environmental learning to take place and for PSTs to become creative themselves. Creative teaching itself generates 'we-creativity' (Tanggaard, 2011) because my co-participants did not only condition certain types of creativity through their planning and teaching, they also showed creative approaches when they were talking about environmental learning, and demonstrated actual process of creativity and pro-environmental behaviour in organising their routines at the university. This finding denotes the inclusivity of creative teaching for both co-participants and PSTs.

There are nine features of creative teaching in my mandala of creative pedagogies framework. Three features are related to changes in the structural arrangement of classes, spaces, and assessment (i.e., adjusting timetables and class layouts, opening communication spaces, and rebalancing assessments). Two features are about strategies for promoting higher order thinking and analysis (e.g., posing cases and problems, and designing divergent thinking exercises). Other features are about changes to my co-participants' teaching (e.g., trying new teaching ideas, tolerating ambiguity, delivering motivation, and performing risk-taking actions).

In this section, I focus on demonstrating three of the nine key themes that emerged during my data analysis in relation to creative and environmental teaching within my co-participants' creative pedagogy praxis, namely:

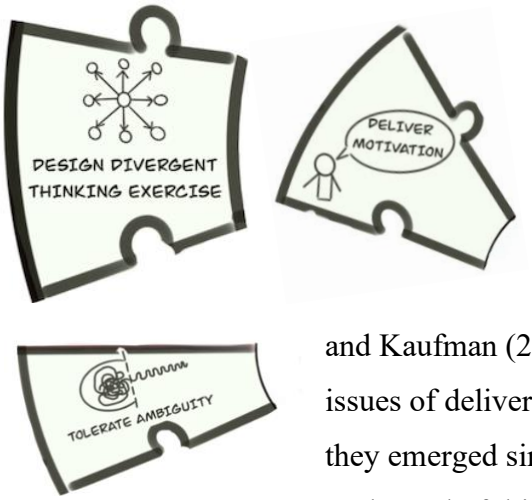
1) designing and evaluating divergent thinking exercises,
2) trying new teaching ideas,
3) performing risk-taking actions.

These three features were approaches that significantly contributed to the development of ecological zones in the ITE program. Some of these features contributed to the knowledge ecology by supporting both the production and circulation of knowledge. For example, with the advancement of learning media, educators may choose to approach a multimodality in delivering knowledge through the trials of new teaching ideas, which need to be supported by practical strategies to understand how knowledge could be best circulated in the classroom. Such practical strategies come as other mandala strategies are employed, namely adjusting timetables and class layouts and opening space for communication. The latter can also be implemented to gauge an understanding of the learners' knowledge interests. Moreover, educators who want to shift the focus from learning outcomes to meaning-making need to consider alternative forms of assessment, such as an ongoing cumulative assessment rather than an authentic traditional assessment. An ongoing assessment may appear as feedback loops that can be integrated into divergent thinking exercises. This teaching sequence potentially connects knowledge, culture, and natural environment ecology.

Possibilities of coalescing the knowledge ecology and 'a culture of concern' further became visible as divergent thinking exercises were combined with motivation delivery. Barnett (2018) borrows 'a culture of concern' from the Heideggerian term, and refers to it as 'a culture that turns on disposition of care, openness, and generosity' (p. 64). This culture of concern can be established by applying new teaching ideas that allow flexible class layouts and space for communication. The interplay of these creative teaching features not only strengthened the position of the ITE programs as safe spaces for students, they also ameliorated the culture of critical discourse within the institution (Barnett, 2018).

I demonstrate the three features of the creative teaching segment of the mandala in action during the research activities, beginning with designing and evaluating divergent thinking exercises.

Designing and Evaluating Divergent Thinking Exercises



Divergent thinking exercises appeared consistently in all of my co-participants' classes, which pooled and explored a wide range of workable alternatives to sharpen the PSTs' ideas, focus, and problem solving, as evident in de Bruin (2018), Baer and Kaufman (2012a), and Barak (2009). I will also highlight issues of delivering motivation and tolerating ambiguity, as they emerged simultaneously to divergent thinking exercises. In the end of this sub-section, I will argue how these three interrelated features stimulate some of Barnett's (2018) university ecological zones in my co-participants' classes.

The three co-participants paired divergent thinking with a convergent thinking exercise (synthesis), which is another puzzle piece in the mandala segment of teaching for creativity. According to my co-participants, they always tried to include divergent thinking exercises within their classrooms. However, Reka mentioned that our introductory workshop had motivated him to use sticky notes to create more interactive divergent and convergent thinking exercises.

Reka promoted divergent thinking in his classes through a synthesis game he called 'playing dice' (Indonesian: *bermain dadu*). In this game, the PSTs were challenged to demonstrate their comprehension of a topic on ecology, as well as creativity in creating sentences, based on a combination of random numbers shown on their dice. Reka did not only assign games to PSTs, he also encouraged them to evaluate emerging divergent ideas together as he questioned: 'If we needed to revise something in these sentences, what would it be?' It was apparent that Reka combined divergent thinking exercises with convergent thinking when choosing the top three syntheses of the day. Reka's

pedagogical action mirrored Zagonari's (2019) portrayal of ideas, where ideas that are generated during divergent thinking exercises can later be structured as convergent thinking exercises.

Aside from the practice of divergent and convergent thinking, Reka's idea of incorporating games into his classes stimulated the PSTs' joy and excitement, as reflected in a PST's commentary: 'The game was really fun. I learnt a lot from it. The class was not boring' – evidencing the mandala feature of 'delivering motivation'. From my observation, it was evident that Reka tolerated the PSTs' ambiguity (another connected feature in the mandala) during the game to allow the development of autonomy traits, which Hedge and MacKenzie (2016) exemplify as choice, interpretation, flexibility, reflection, collective deliberation, and responsiveness. In other words, ambiguity and mistakes within creative teaching practice were regarded by Reka as positive elements for supporting an optimal learning environment, mirroring Tanggaard's (2011) description of the importance of ambiguity in the classroom. Reka appreciated PSTs' ill-defined topics during the dice game, which Ranjan and Gabora (2013) refer to as 'creative interference', with its potentiality to lead PSTs to creative ideation. On other occasions, Reka noted misconceptions from the PSTs' presentations and discussion and commented on them before closing his class. This action demonstrated Reka's orientation toward motivational context and learning guidance.

Reka's flexibility and openness to PSTs' ideas also represented traits that are associated with creativity, according to Clarkson (2005). This game displayed considerable latitude for PSTs to observe a connectedness among divergent ideas on topics of environmental learning as described by Gomez (2007). It is demonstrated in a PST's commentary: 'In this course, we are involved in environmental learning as we visited a *subak* to learn how rice–duck farming works. Then, in the classroom, we were further challenged to make synthesis of what we learnt in the field.'

The PST's commentary also shows how divergent thinking exercises designed by Reka assisted the PSTs to think through environmental dimensions of the place they live in. Reka's creative teaching showed value because of its capability for supporting the

presumption within Barnett's (2018) ecology of knowledge, in which 'scientific knowledge is one more and not the only way of producing knowledge' (Giatti, 2019, p. 30). This series of activities strengthened the position of the natural environment and culture as ecological zones that need to be embraced by the ITE programs. Indigenous practice, like *subak* (Appendix 4), is an example of how the Balinese people cope with ecological uncertainties. The time PSTs spent interacting with local farmers in the *subak* generated their cultural knowings about rice–duck farming, and were practices of building adaptability, which Walker et al. (2004) define as 'the capacity of humans to manage resilience' (p. 3). This process of 'ecologising knowledge' is vital for promoting an engagement between higher education and society in order to mitigate local environmental issues (Giatti, 2019, p. 31).

In one of Ryan's classes, he facilitated a 10-minute brainstorming session about Classroom Action Research (CAR). He supplied a series of guiding questions to generate PSTs ideas about CAR, without evaluation or criticism, to encourage PSTs' piggybacking. This action echoed Bonnardel and Didier's (2020), Henningsen and Henningsen's (2018), and Osborn's (2012) views on the importance of 'conscious guidance' during the idea-generation process, to induce creative thinking and build on the ideas of others. A 'divergent thinking warm-up' (Grohman & Szmidt, 2013), which was presented in Ryan's classes, not only provides a safe and supportive space, it also assists PSTs to concentrate on problems, topics, and tasks on local environmental issues incorporated into the lesson. However, Ryan did not allow for freewheeling or offer an invitation for impractical ideas to spark fantasy, which is another principle of brainstorming proposed by Osborn (1953).

It became evident that Ryan tolerated ambiguity and mistakes of PSTs to enable the flow of creative ideas in their classes. As an example, Ryan posed questions with inherent ambiguity to encourage PST#6 to 'relate distant concepts and examine ideas from new perspectives' (Ranjan & Gabora, 2013, p. 123). Ryan's response gestures towards Diane's (2017) report of ambiguity tolerance to promote the creative side of uncertainty and doubt. I detailed the interaction between Ryan and PST#6:

PST#6: For a new teacher, CAR helps them choose approaches or methods which are suitable for students' characteristics.

Ryan: So, only for new teachers?

PST#6: That's in one side. Or, a teacher who has applied several different teaching approaches, but the learning outcomes are just the same. Thus, they can evaluate their teaching model by implementing CAR.

Ryan: How about experimental research? Some teachers choose experimental research to improve their class practices. Which one do you think is more effective?

PST#6: Maybe through CAR would be more effective as it gives more exploration on the students' characteristics?

Ryan: Okay, let me synthesise your answers. What is going to happen when a teacher decides to implement more experimental research than CAR? Why? From its feasibility, which one is easier to conduct, experimental research or CAR?

PST#6: Experimental research.

Ryan: Then, significance wise? I mean, which one gives direct impacts to the students?

PST#6: CAR?

Ryan: Yes, CAR. It consists of reflection. If you have completed your experiment and you'd like to improve a few things, you need to re-design your experiment in a new one. While CAR provides flexibility for a teacher to do reflections. They can simply change their lesson plan in the next cycle.

Ryan's creative teaching endorsed Barnett's (2018) cultural ecology by minimising a culture of critical discourse and embracing a culture of concern. He welcomed divergent ideas from the PSTs through a disposition of patience and understanding without judging them or causing discomfort. The culture of concern was also supported by my co-participants using reinforcement and motivation (another connected feature in the mandala). Ryan's reinforcement was obvious in class observations even in the way he commenced his class by giving every PST a high-five. Ryan demonstrated that he would like to feel the positive energy from all PSTs with his comment: 'Let us do something different today. I want to check your readiness, whether you are keen and enthusiast to learn.' Ryan also emphasised the importance of contributing to the class discussion through encouraging, 'you don't need to browse Google to find the answer. Your opinion is highly valued.' On another occasion, Ryan showed his appreciation

towards the PSTs' contribution to the class discussion by mentioning the most interesting part of each group's presentation. Ryan's appreciation towards the PSTs' divergent ideas demonstrated the interrelatedness between two puzzle pieces (designing divergent thinking exercises and delivering motivation) in the segment of creative teaching.

Elements of maintaining motivation in Aya's classrooms seemed to not merely be about delivering divergent thinking exercises, but also about adjusting the goals of learning and assessment to encourage PSTs' intrinsic motivation, as described by Baer and Kaufman (2012b). For instance, Aya exemplified the imperative of process rather than product in her entrepreneurship class, as represented by her comments: 'We do not demand perfect products from you. What is more important is the process (of making pop-up books) that you will go through,' and 'I saw your draft of page 5 on our WhatsApp group this morning. It's looking good, even so much better from last week.'

From her comments, it is evident that Aya set a clear expectation to actualise PSTs' creative potential through creative processes and outcomes. Aya sought to obtain tangible products from the PSTs in the form of a pop-up book. She also aimed to elicit the PSTs' internal transformative outcomes, as outlined by Ranjan and Gabora (2013): development of a creative domain; enhanced understanding; establishment of personal meaning; and growth of acceptance and confidence. Yet, Aya's expectations were not met well by some PSTs, as they skipped classes when it was their turn to present the progress of their pop-up book. Consequently, group presentations were only carried out by one or two PSTs. Considering this, Aya expressed positive reinforcement, 'I hope everyone will still have the same spirit as three weeks ago to complete this project,' and 'To PST#1 who is presenting alone today, I really appreciate your effort. Please do not lose your spirit.'

Positive reinforcement was apparent in Reka's classes when he showed appreciation for PSTs' hard work by applauding presentations and encouraging the audience to deliver what they liked about the group presentation or report. In administering class discussion, Reka invited the PSTs to participate with his comment, 'please share your opinion, don't be afraid,' inviting divergent thinking even if it was uncomfortable. He continued delivering reinforcement as he stated, 'I do really appreciate your effort. You guys are very proactive in learning,' at the end of class discussion. Reka also epitomised giving encouragement to PSTs with low motivation in learning. In one meeting, it became apparent that Reka focused on enhancing the confidence of two PSTs by checking on their work progress, encouraging them to share their ideas with others, and asking them if they had problems or questions. Reka further identified the PSTs' feelings before closing his class by asking them to rate their divergent thinking learning experience using colourful sticky notes, where red represented dissatisfied, green represented satisfied, and yellow represented OK (Figure 26). Figure 26 shows that fourteen PSTs were satisfied with the learning while the remainder stated that the learning was OK.

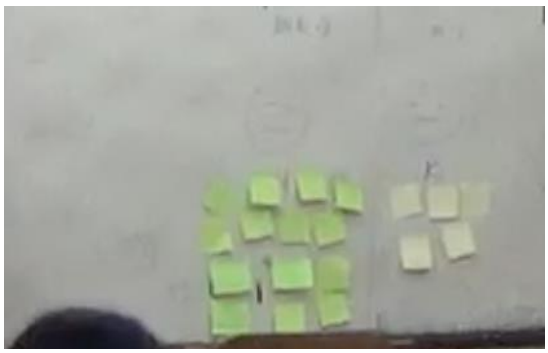


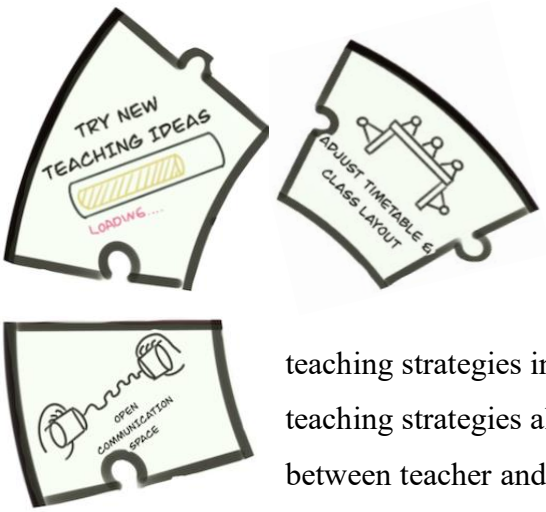
Figure 26 – The PSTs' level of learning satisfaction in one of Reka's class

Divergent thinking exercises, supported by motivation delivery and ambiguity tolerance, are core elements of creative teaching. This is important in the context of my study and for supporting Barnett's model of an ecological university, particularly the dimensions of learning, knowledge, and culture ecology. The interconnectedness between these three puzzle pieces mimics the complex adaptive systems of an ecosystem, resonating with Jackson's (2016) concept of learning ecology: feedback loops, interdependence, and cooperation. In this inquiry, my co-participants

demonstrated how divergent thinking exercises could contextualise Balinese cultural and environmental movements to introduce to the PSTs notions of interdependence and cooperation. Such divergent thinking exercises, as incorporated by the ITE educators, allowed the PSTs to learn that production and delivery of knowledge occurred as they interacted with farmers and their indigenous practices. The use of positive reinforcement and motivation by the ITE educators during the enactment of divergent thinking exercises aligned with the concept of feedback loops – imperative to transform the critical discourse into a culture of concern within classrooms. In this sub-section, I also showed that divergent thinking exercises were the gateway to embracing vagueness to boost both learners' autonomy and a culture of concern in the classroom.

I now turn to the second key feature of creative teaching in the mandala framework, to explore how my co-participants undertake new teaching ideas within their classes.

Trying New Teaching Ideas



In this sub-section, I will provide examples of new teaching strategies used in my co-participants' classes. From my observations, new teaching ideas often occurred with an adjustment of class time and room layouts – two other creative teaching strategies in my mandala. My co-participants' new teaching strategies also seemed to open a communication space between teacher and PST, and among the PSTs themselves. This interconnectedness implies that new teaching idea trials tend to stimulate the application of other puzzle pieces in creative teaching.

Ryan implemented five new teaching ideas in his classes within my period of observations: six thinking hats; certainty of response index; Venn diagram drawing; lecture-recording; and role play. He experienced the six thinking hats activity during our introductory workshop on creative pedagogy, used there to determine his focus of environmental learning. He decided to bring the six thinking hats concept to his own

class to stimulate the PSTs' creative thinking, as depicted in his commentary: 'how would you connect these environmental problems with your research?' Ryan combined the six thinking hats with a certainty of response index to help the PSTs design classroom action research (CAR) in groups. In this case, he used the six thinking hats to stimulate creative ideas through 'associative memory' (Göçmen & Coşkun, 2019) and collaborative brainstorming. The PSTs presented their proposed group research topics while holding certainty of response index cards, labelled with levels of confidence, such as *confident*, *hesitant*, and *not confident*. Ryan's use of this certainty of response index led directly to his teaching for creativity strategy (another element of Lin's (2011) creative pedagogy), building a supportive context to stimulate the PSTs' confidence. This exercise established confident learners as it aligned the PSTs attributes by being respectful when making reasoned evaluations during group discussion, leading them to make personal, informed decisions.

After the PSTs' research topic identification work with the six thinking hats, and subsequent presentation of their ideas with their degree of confidence rating, they went on to map their interactions with Venn diagrams. Ryan explained the procedure of drawing a Venn diagram and its benefits for stimulating the PSTs' creative thinking with the comment:

> Say I'm going to conduct a CAR about environmental learning, what variables are possibly connected here? This is creative thinking, to create a concept using a Venn diagram. I will review the numbers of logical relations emerging in it. (Ryan)

It was evident that Ryan connected his teaching sequence, and the PST's learning, with creative strategies to strengthen the PSTs' understanding of CAR. The PSTs' comments acknowledged the benefits they gained from Ryan's teaching sequence:

> For me, I gained deep understanding of CAR as you took us through experiencing various learning models in this meeting. (Nina)

> The series of teaching strategies used in this meeting helped me to understand CAR effectively. (Kris)

During a discussion about the validity of different research approaches when conducting the CAR, Ryan established a space for discussing sustainable practices further. He

diverted the analogy of cutting trees into tools for catching dragonflies. This phenomenon is known as a 'creative micromoment' or 'a brief surprising moment of creative potential that emerges in everyday routines, practices, and planned experiences' (Beghetto, 2013). It became evident that Ryan embraced unexpected ideas from the PSTs to explore alternative ways of bringing pro-environmental views to the dialogue. As Ryan obtained various responses from the PSTs, he incorporated facts about dragonflies and mindful ways of catching them. Ryan's initiative was closely related to an identified concern about the PSTs' unethical manner of collecting and treating animals, such as frogs, for its anatomy observation. He also linked a second analogy to quantitative research validity through careful elaboration. This finding signifies Ryan's creative ideation, in accordance with Osborn's (1953) notion of collaborative brainstorming, to use both judicial and creative minds to impede malevolent creativity. This interaction is portrayed as follows:

Ryan: Let's discuss another analogy in relation to our environment. Say you are going to catch a dragonfly. What tools are you going to use?
PST#1: A net.
PST#2: My hands.
PST#3: A small broom.
Ryan: Yes, the most appropriate one is using an insect net thus the dragonfly will not die. Its parts of the body will not be broken. If you use your hands, you will hurt them. In this case, we need to consider the suitability of our measuring technique, that is what we call validity. To avoid hurting the dragonfly so that you will be able to research or learn about its body parts, its segments such as abdomen, or its morphology, the most suitable tool that you use will be an insect net. If you use a stick with glue or sticky rubber to catch a dragonfly you will not be able to observe its wings as they will be broken. If you use your hands, it will need a longer time as dragonflies have compound eyes or facets, which enable a nearly 360-degree vision. Like statistics, you can use any tools, but you need to choose the tool that is most suitable to your purposes.

Reka combined the brainwriting technique from the introductory workshop on creative pedagogy with a modified KWL strategy (Greenwood, 2019) in his classes to engage PSTs in their own learning in a biology unit. Reka asked the PSTs to write things they learnt from their last meeting on green sticky notes, things they did not grasp from the

last meeting on red sticky notes, and questions they had for the current meeting on yellow sticky notes. The PSTs wrote one or two statements on these colourful sticky notes to train themselves in structuring information effectively. After having all the PSTs write their reflections, Reka continued by combining the brainwriting activity with the jigsaw method and role-play – where the PSTs were invited to discuss research topics relevant to biology from three different point of views: economic, socio-cultural, and ecological perspectives. This combination of teaching ideas created a space for the PSTs to explain, argue, and give suggestions to their peers. During the jigsaw session, Reka roamed the class and asked if PSTs encountered any difficulties or problems. He offered the autonomy of learning to PSTs while closely observing the interactions and discussion among the PSTs.

As discussed in the previous sub-section (designing divergent thinking exercise), Reka's new ideas of bringing a dice game into his classes epitomised a creative and fun approach to accommodate participation in active problem-solving, information sharing and gathering between adult students, which aligns with Lamey and Bristow's (2015) belief that games could be used to accomplish a range of outcomes, including ownership of learning. It is evident in his commentary:

> I designed this game as a medium to stimulate the PSTs' synthesis skills, collaboration, and creativity. I hope they enjoyed this game and the PSTs who were reluctant to participate becomes more engaged in their own learning. (Reka)

In order to offer a new creative experience for PSTs, Aya presented an art-based intervention in her entrepreneurship class. The PSTs embarked upon a pop-up book creation around the theme of rectifying local environmental degradation. In the first week, the PSTs examined and analysed an environmental issue that would be the central topic of their 6-page pop-up book. In the second week, the PSTs presented a PechaKucha (set format presentation) about their pop-up book plan. Then, the PSTs brought one page of their pop-up book on a weekly basis (as evident in Figure 27). During this period, the PSTs gradually made modifications based on their peers' feedback while Aya supported the PSTs' learning by signposting the underpinning theoretical knowledge base, an approach identified by McKeown et al. (2015). This underpinning included the Balinese *subak* cultural landscape (SCL). This sequence of

creative teaching and learning supports De Sousa's (2011) views on the importance of adequate time allocation for communication processes to ensure smooth construction of creative ideas. Aya's practice also aligned with Daniels' (2013) perspective on the importance of enabling personal choices, as shown within this forum (e.g., the PSTs can stand apart from their peers' viewpoint). This practice, according to Daniels (2013), accommodates learners' creative tendencies while also teaching them to set appropriate boundaries. Aya's action also exemplifies Grohman and Szmidt's (2013) belief that the aim of creative tasks is in assisting students to overcome obstacles, such as peer pressure and fear.

At the end of the course, the PSTs wrote positive responses in their questionnaire about trying new teaching or learning ideas, as captured in these three commentss:

> This creative project stimulated us to be more autonomous. We also had to work hard in completing our pop-up book. (Lita)
>
> This is a fun upcycling project where we could explore our creative abilities. (Kadek)
>
> This project gave me a creative experience, which motivated me to create something new from trash. (Murni)

Figure 27 – Two PSTs presenting the progress of their pop-up book

The trials of new teaching ideas within my co-participants' classes were often accompanied by adjustments to class layout and time. They found that it was important to (re-)configure the time and physical space of learning when implementing creative environmental teaching. Integrating creativity into teacher education programs, although highly desirable, is often seen as unrealistic due to time constraints (Hong et al., 2017). All of my co-participants demonstrated a flexibility of time allocation during their creative teaching, emphasising Nyroos' (2008) argument for facilitating new approaches to teaching and learning through duration changes. For example, Reka added 2-5 minutes to allow PSTs to recap their group discussions. Ryan occasionally extended his class periods up to 30 minutes as he did not run several classes due to public holidays. Meanwhile, Aya resolved the same issue by scheduling additional meetings for presentations and consultation. These adjustments to class timetables eliminated barriers to communication between my co-participants and the PSTs due to time constraints.

The university where this research was conducted provided PSTs with wooden chairs with tablet arms, which could be easily moved (Figure 28). My co-participants embraced this flexibility by regularly changing their classroom seating arrangements for various learning purposes, including to enact creative and environmental teaching. With seating and room arrangement changes, my co-participants supported the PSTs' learning experience, for example opening space for holistic learning and interaction within their learning community, similar to strategies outlined in other creative

pedagogy research by Harvey and Kenyon (2013), Rands and Gansemer-Topf (2017), and Reinke (2018).

Figure 28 – Regular seating arrangements from the university

Aya, Reka and Ryan adjusted PSTs' seating arrangements into a more comfortable space every time they administered small group discussions during their creative and environmental teaching practices (Figure 29 and Figure 30). Aya's and Ryan's configuration of spatial arrangements reinforced their creative agency in providing a learning ecology that supports mutual engagement between ITE educators and PSTs. This finding is consistent with previous study about flexible learning environments by Deed et al. (2020).

Figure 29 – Reka changed the traditional lecture setup into group pods

Figure 30 – Aya adjusted the traditional lecture setup into group pods

Reka organised a flexible learning environment each week, where he changed his classroom seating arrangement from a traditional lecture setup to a circular group. He also asked PSTs to transform their classroom into an exhibition venue to display their posters, reports, mind maps, and concept maps (Figure 31). This type of environment is pivotal to stimulating dialogue and shared thinking between PSTs, as described by Purcell (2019).

Figure 31 – Reka transformed one of his classes into an exhibition venue for the PSTs

The three features of creative teaching described in this sub-section – trying new teaching ideas, often in combination with adjusting timetables and class layout, and

opening a communication space – appear to be relevant to extending the capacity of educators to deepen engagement with Barnett's (2018) university ecological zones of the knowledge ecosystem in ITE programs. The interrelatedness between these three features (of the creative teaching segment of my mandala framework of creative pedagogies) provides opportunities for the growth of systematic inquiry into different forms of knowledge. As noted in Chapter 2, the ITE program in which this research took place has adopted and disseminated Western scientific knowledge. Although stated as an important inclusion in the university's vision, Balinese indigenous knowledge was not explicitly embedded in teaching and learning. Acknowledgement, and an embracing, of Balinese indigenous ways of knowing were evident within my co-participants' praxis of creative and environmental teaching initiated through efforts to 'experiment with new ways of comprehending the world' (p. 147) to 'break through the thinness of the contemporary knowledge forms' (Barnett & Bengtsen, 2019, p. 148). They looked at the world of education through a framing of a Balinese worldview, then combined their teaching with scientific methods of approaching a problem. For instance, the Balinese guiding principle of *palemahan* (achieving harmony between human and nature) inspired Reka to position his teaching around *subak* cultural landscape (SCL) biodiversity through the combination of a jigsaw method and role-play. Another example in relation to the *palemahan* philosophy is the emergence of 'environmental degradation and how to resolve it' as a central theme in Aya's pop-up books project.

The creative teaching performed by the co-participants supported key dimensions of Jackson's (2019) learning ecology (contexts, affordances, resources, spaces, places, relationships, and activities). Jackson describes that 'a learning ecology is also an ecology of practice in which the primary purpose is learning' (2019, p. 87). When the co-participants considered integrating Balinese indigenous knowledge into environmental learning, they established a context of learning for both themselves and PSTs. This context brought them possibilities for encountering new teaching ideas, which could be perceived as professional development. As discussed in our introductory workshop, the co-participants sought to adapt and accelerate their teaching practices with new ideas, demonstrating what Pendleton-Jullian (2019) refers to as an 'elasticity'

of individuals within an ITE ecosystem. The idea of 'elasticity' implies the natural process of transformation within my co-participants' agency in reforming their practices without losing their own perspectives, through engagement with various resources, spaces, places, and relationships. After connecting their own learning ecologies, my co-participants facilitated a micro 'learning ecotone' (an indivisible ecosystem connecting two habitats in tension: indigenous knowledge and Western knowledge) for the PSTs by inviting them to participate in socially embedded experiences of learning (e.g., group discussion, games, collaborative projects, and *subak* site visits) (Pendleton-Jullian, 2019, p. 124). The ITE educators' expertise, creativity, and agency transcended their traditional teaching practices into an innovation of teaching and learning, which, according to Pendleton-Jullian, may be effective for stimulating resilience in a time of perpetual change.

As the nature of sustainability is that it needs to be constantly contextualised, recontextualised, and recalibrated (Wals, 2019), environmental learning within ITE programs demands a more localised pedagogical alternative. From the co-participants' creative teaching, it seemed that applying creative pedagogies created a regenerative space, which invited the PSTs to develop four perspectives, namely: (1) connecting with the nature, people, places, and other species (*relational*); (2) questioning, framing, and untangling environmental issues (*critical*); (3) initiating change through being and becoming (*actional*); and (4) discussing moral dilemmas (*ethical*). These four perspectives are seen as key by Wals (2019, p. 65). When Aya and Reka constructed learning environments with the inclusion of *subak*, they formed an entry point to the ecology of the natural environment, nested in the Balinese community but often unlinked in ITE programs. Rather than presenting a lecture on *subak* degradation, Reka invited the PSTs to rethink ways *subak* could be incorporated into a school curriculum and into the design of biology as a subject in secondary schools. In the context of sustainability, Ryan showed us how he offered a discursive space to imagine embedding environmental learning in the PSTs' future theses, and an eco-friendlier approach to nature observation. Aya brought relationality into her classes by introducing a project to upcycle household waste. Although transgressive actions were not actively criticised, the co-participants' creative and environmental teaching exemplified steps to reorient

learning ecologies to connect ethically with the ecology of the natural environment in an ITE program.

Now I turn to the third key feature of creative teaching in the mandala framework that regularly emerged in my co-participants' classes.

Performing Risk-taking Actions

In this sub-section, I will discuss the last puzzle piece of creative teaching: performing risk-taking actions. While a journey of new or unique teaching approaches always brings a bit of intellectual, social, psychological, and emotional risk-taking (Daniels, 2013), academics are often portrayed as risk-averse and status-conscious individuals who drive their students to risk-taking enterprise (Cunningham-Bryant, 2019). Yet, it was evident that the co-participants were willing to perform risk-taking when they volunteered in this research, as they had no prior experience of implementing creative pedagogy for environmental learning.

The performing risk-taking actions puzzle piece is often supported by other creative teaching strategies in my mandala, i.e., rebalancing assessment. When creativity is not a statutory element of a university, ITE educators who value creativity also need to determine approaches for inclusion of meaningful assessment (Bolden et al., 2020; Lucas et al., 2014). The unavailability of tools that could measure progression in creativity in higher education was raised as a concern of the co-participants'. Thus, the co-participants' attempts to find tools that could assess creative dispositions and learning during this research demonstrated their courage. I will first provide examples of risk-taking action by the co-participants, then move on to discuss their initiatives in rebalancing assessment form. This account will show how the ITE educators' bold creative movements have paved the way for the reinvention of environmental education within their department.

Aya enlisted PechaKucha's 20x20 presentation format in the first meeting of her entrepreneurship class, to discuss local environmental issues and the importance of eco-friendly business activities. Opposed to traditional speaking styles, PechaKucha's timing of each slide is both constraining and enabling (Ave et al., 2020; Lucas & Rawlins, 2015), which Aya stated was challenging. This finding signifies Aya's risk-taking, during which she embraced uncertainty and a possibility of failure (Cunningham-Bryant, 2019; Radloff et al., 2019), to achieve her desired goal, such as delivering a presentation via a creative format.

ITE educators usually present different research methods in a lecture format due to their theoretical nature. Despite this, Ryan took the risk of incorporating group discussions, problem-based learning, and entertaining videos into his research methods course to complement the lecture. He viewed his course as a joint venture between himself and the PSTs, where the PSTs' comprehension should be carefully and regularly checked, 'I would like to see how your comprehension changes. Let's compare your answer before and after my lecture.' He also offered re-examination of his prior teaching through reflective actions that took place in the beginning of his classes, risking critical comments about his teaching.

Similarly, in one of Reka's classes the PSTs were asked to reflect on their learning through brainwriting. Reka asked the PSTs to write keywords or key phrases on three sticky notes of different colours (green, red, and yellow): the green sticky note represented *things I learnt from the last meeting;* the red sticky note represented *things I did not grasp from the last meeting*; and the yellow sticky note represented *question(s) I have for today's meeting*. Reka started by addressing the red sticky notes, 'I'd love to see and respond to all these red sticky notes because they contain the hardest statements every educator needs to face.' (Figure 32).

Figure 32 – Reka read the PSTs' key phrases on the red sticky notes

Reka demonstrated another risk-taking action when he changed his class into an exhibition-like venue where the PSTs delivered their poster presentations. He was aware that the class might be noisy as the PSTs roamed, presented, asked questions, and argued with one another. In one of his comments Reka also highlighted the tension that might arise during this venture:

> I know that there is a likelihood of escalated arguments between PSTs within this forum. I am aware of it very much, but I am going to hold this mini exhibition. I would like to see how the PSTs take ownership of their learning. (Reka)

Scholars working in the field of creativity often debate the assessment and evaluation imperative within creative practices, for example their impacts on one's intrinsic motivation (Amabile, 1998; Baer, 2013). During my data collection period, instruments for assessing creativity were discussed by my co-participants several times. They questioned what domains of creativity need to be specified when measuring PSTs' creative outcomes. They acknowledged that assessing creativity would be complicated when predictive criteria were not available, similar to Hong et al.'s (2017) finding. My co-participants' perspectives also resonated with Fraser et al.'s (2017) argument that summative assessment needs to be re-considered as outcomes of learning would be less predictable in creative teaching. My co-participants' stance was also consistent with the prominence of suspending grading and scoring during creativity lessons to foster students' self-evaluation, as outlined by Grohman and Szmidt (2013).

From a series of class observations, I discovered that my co-participants endeavoured to design their assessments in non-text-like activities. In one immersive learning experience, Reka designed a 'mental map' task (Fiebelkorn & Menzel, 2019) as an assessment to obtain the PSTs' worldviews pertaining to biodiversity and species abundance in a local landscape. This finding aligns with Cole et al.'s (1999) views that ITE educators need to gauge new methods and formulate guidelines to assess PSTs' creativity, while providing support for them. Reka, for example, collected portfolios, sticky notes, and concept maps from the PSTs on a weekly basis to complement their final article at the end of semester. I will discuss in the next sub-section (teaching for creativity) how peer-assessment in Reka's classes is further connected to another creative pedagogies mandala puzzle piece – building the PSTs' confidence and persistence.

I observed that Aya's assessment was structured to monitor and evaluate more of the creative process than the creative product. She used forms of formative assessment, such as a reflective questionnaire, the PechaKucha presentation rubric, and a pop-up book rubric. Aya administered the questionnaire before her PechaKucha presentation to gain information about the PSTs' prior knowledge on environmental degradation. This is ample evidence of a learning dialogue that leads to interpretations of the PSTs' earlier learning outcomes (Black & Wiliam, 2018). She then steered the learning dialogue by asking the PSTs to report on the progress of their pop-up books every week through a PechaKucha presentation, followed by peer feedback and revision. By the end of the semester, Aya invited the PSTs to assess and evaluate their peers' pop-up books (Figure 33). Besides giving a score, PSTs delivered oral feedback to their peers as well as giving responses or answering questions when necessary.

Figure 33 – A group of PSTs observing their peers' pop-up books

Both Reka and Aya used a range of assessment strategies to create whole class teaching, exemplifying William and Thompson's (2008) five key strategies in formative assessment, namely: (1) discussing learning intentions and criteria for success; (2) administering classroom discussions, questions, and tasks; (3) delivering feedback that stimulates learning; (4) enabling students to act as instructional resources for one another; and (5) facilitating activities that stimulate students' ownership of learning.

My co-participants started by clarifying learning aims and criteria for creativity. During lesson planning, Reka and Aya developed classroom discussions and learning tasks to obtain evidence of the PSTs' understanding, including methods of marking (e.g., interactive discussions, presentations, peer-assessment, portfolios, and individual reflections). The peer-assessment activated the PSTs as 'instructional resources for one another', while portfolios and individual reflections positioned the PSTs as 'the owners of their own learning' (William & Thompson, 2008, p. 16). These written and verbal productions were then interpreted by the co-participants. When Reka and Aya decided

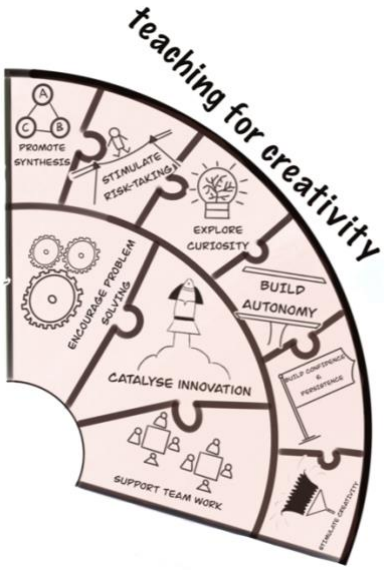
to use tasks as summative assessments, they scored the PSTs' works and returned them with feedback.

With these assessment practices, it was evident that my co-participants focused on improving the PSTs' creative performance rather than judging them on the merit of previous performance. They also invited the PSTs to share their learning aims. While Reka and Ryan relied on the generation of text as a final summative assessment, they took the risk of diversifying their formative assessment methods. These approaches may potentially reduce the impact of outcome-oriented education, which Morini (2020) asserts 'clogs' knowledge ecologies and thus leads graduates to 'appear to be more inclined to commit unethical behaviour such as plagiarism' (p. 56).

As Barnett (2018) outlines, risk-taking found within the co-participants' creative teaching put them on their mettle. For instance, the ITE educators did not only challenge themselves to construct appropriate assessment for learning, they also encouraged the PSTs to perform their own learning assessments. This element of challenge is supportive of manifesting Barnett's (2018) ecological curriculum in the ITE program where this research was conducted. Examples of risk-taking actions, as elaborated on in this sub-section, show how they supported my co-participants to sustain dialogic approaches and bring the PSTs freedom to roam when learning. Amid the creative tensions that had been created, the ITE educators' risk-taking actions offered a sense of interconnectedness for the PSTs' personal learning ecosystem, where they link with spaces, places, and people (other students).

I now explore the second element of creative pedagogy – teaching for creativity – again through my creative mandala framework of interconnecting pedagogy segments.

Teaching for Creativity



Teaching for creativity is defined by Grohman and Szmidt (2013) as 'teaching attitudes towards creativity and teaching how to develop students' creative thinking skills and behaviour' (p. 16). When the concept of teaching for creativity enmeshes with environmental learning, the purpose of teaching expands to activate students' resilience or 'personal and contextual resources to enact agency and promote well-being despite the constraints' of the learning (McKay, 2021, p. 2). Resilience is mentioned by Barnett (2018) as a vital quality for students, who are would-be professionals, to discern the complex world. In the context of ITE programs, ITE educators hold the dual role of being resilient themselves and having a responsibility for building PSTs' resilience. Baron and Baron (2019) argue that resilient teachers explore strategies to be self-fulfilling in order to maintain their career paths. It is then important to build PSTs' resilience to sustain growth and manage difficult circumstances for the near future (Mansfield et al., 2018).

In this section, I incorporate the co-participants' support for PSTs in constructing their personal resources for resilience: creativity, self-confidence, problem identification skills, risk-taking, and collaboration skills. As resilience and engagement are intertwined (McKay, 2021), the co-participants included activities that could shift PSTs' capacity to manage barriers in, and to, learning; hence, they attained higher levels of learning involvement. Teaching for creativity for the co-participants was a lens that focused on developing learners as whole persons. This element of creative pedagogy assisted the co-participants in enquiring into the ecology of persons – building the PSTs' resilience as the next generation of biology teachers. In the meantime, the co-participants' teaching for creativity advanced the ecology of learning within their units of teaching.

There are nine features of teaching for creativity in my mandala:

1) promoting synthesis by PSTs,
2) stimulating risk-taking and mistake-making by PSTs,
3) exploring and awarding PSTs' curiosity,
4) building autonomy of PSTs in accomplishing creative tasks
5) supporting teamwork among PSTs,
6) encouraging problem-solving by PSTs,
7) building PSTs' confidence and persistence,
8) encouraging innovation by PSTs,
9) stimulating PSTs' creativity inside and outside of class time.

These puzzle pieces support the process of being, and becoming, for the PSTs. For instance, curiosity, self-confidence, autonomy, and persistence are valuable learning outcomes to promote when enacting this element of creative pedagogy. As learning happens in social situations, the co-participants combined teaching strategies that developed the PSTs' personhood with strategies that connected them to their peers. In the next sub-section, I will detail three major features of teaching for creativity, namely:

1) stimulating risk-taking and mistake-making by PSTs,
2) exploring and awarding PSTs' curiosity,
3) building autonomy of PSTs in accomplishing creative tasks.

Again, these three key features of teaching for creativity also connect and exemplify further features in my mandala framework. I will argue how these three key aspects of teaching for creativity supported two dimensions of Barnett's (2018) university ecological zones: ecology of persons and ecology of learning.

Stimulating Risk-taking and Mistake-making by PSTs

As the modern world is always changing, and thus individuals are in a perpetual disjuncture, Jarvis (2006) argues that students should be engaged in life-world challenges through learning experiences. One way of preparing students to face those challenges is by building their capacity to navigate uncertainties through risk-taking and mistake-making. In the context of teacher education, Radloff et al. (2019) argue that the practice of risk-taking actions is imperative to grapple with educational policy reform and future pedagogical change. In this sub-section, I will discuss the co-participants' initiatives in encouraging risk-taking and mistake-making actions by the PSTs. From my observation, this puzzle piece is interconnected with delivering reinforcement and motivation – a feature of creative teaching – and another mandala puzzle piece of teaching for creativity – building confidence and persistence in the PSTs. As indicated in the introductory section of this chapter, many of the different creative pedagogy features occurred simultaneously. Stimulating risk-taking and mistake-making actions encompasses providing encouragement or 'positive emotions' (Ponticell, 2003, p. 6) that facilitates the PSTs' risk-taking actions to 'fail smartly' and 'fail safely' (Brooks & Holmes, 2014) when they learn to be creative. Reinforcement also diminished power structures between the ITE educators and the PSTs, which, according to Cunningham-Bryant (2019), potentially supports 'liberatory learning' as they leave their 'individual snug cocoons' (p. 50).

While my focus is not on identifying the PSTs' risk-taking behaviour as a response to my co-participants' teaching for creativity, I profiled that most of the PSTs hesitated slightly before beginning to participate in classroom discussions. However, they were not risk averse as they had a willingness to experiment with new ideas as their confidence developed, gesturing towards Lemon's (2019) conceptualisation of PSTs' risk-taking behaviour as 'early adopters' of new technology or pedagogy. Learning activities designed by the co-participants resonated with Radloff et al.'s (2019) findings about endorsing risk-taking and mistake-making as positive and productive actions

through reinforcement. For instance, the ITE educators stated that mistakes were perceived as an opportunity to learn rather than as a failure, thus mistake-making in their classrooms would not be penalised. This is shown in the comments:

> Mistakes will not be penalised. Let's exchange ideas. (Aya)
>
> Just write what is on your mind right now. Please do not think about right or wrong ideas. When an idea crosses your mind, just jot down. (Reka)
>
> There is no wrong opinion. I highly appreciate your ideas. (Aya)
>
> Any hats can come first. No problem. Please elaborate the reason behind your decision of using these hats, alright? (Ryan)
>
> Please speak louder, it is alright. You need to be heard by your friends. (Reka)
>
> Be confident and keep calm. Don't forget to answer your friends' questions. (Ryan)

Engaging in risk-taking/mistake-making actions mean making sense of ways to manage challenges. According to Beghetto et al. (2020), 'people who have confidence in their creativity and are willing to try out new things and make mistakes would likely engage in more creative activities and enjoy more creative accomplishments' (p. 2). This implies that the development of confidence and risk-taking should aligned. In the next few paragraphs, I will highlight the co-participants' teaching for creativity strategies that aimed at building the PSTs' confidence and persistence, supporting the growth of intellectual risk-taking.

Reka used peer review as a considerable strategy to develop the PSTs' confidence and persistence. Peer review was conducted for creative performances, such as presentations, concept maps, and posters. Reka enhanced PSTs' peer review experience by providing explicit sets of rubrics (Table 8 and 9), which guided the PSTs in assessing their friends' creative works and delivering feedback. According to Chen-Chung et al. (2016), Reka's rubrics likely affected the PSTs' self-efficacy and evaluation of creativity, aligning with his principle-based assessment. In his class, peer review offered an experience of socio-personal interaction, which boosted the PSTs' confidence, as elaborated by one PST:

> The feedback I gained from my peers during our poster exhibition helped me to see and resolve issues that I was not aware of in my article, from my conceptual framework to bibliography writing. It was really helpful that it made me confident when I submitted my article. (Suma)

Table 8 – Rubric for assessing posters and concept maps in Reka's class

Scoring Number	Aspects to assess				
	Layout (3-39)	Colour (1-13)	Detail (1-13)	Main Idea(s) (1-13)	Hierarchical level (2-26)

Table 9 – Rubric for assessing presentations in Reka's class

	Criteria (1-4)	PSTs' Code						
		C1	A2	A3	A5	A6	A7	A8
PowerPoint slides	General Overview							
	Rationale							
	Text (Choice of font and format)							
	Accuracy of content displayed in the slides							
Presentation	Opening							
	Focus							
	Organisation							
	Voice							
	Q & A							
	Total Score							
	Mean							

The combination of problem finding, synthesis making, and peer review within Reka's classes built the PSTs' self-confidence and persistence. This increase in self-confidence and persistence is also supported by Anderson's (2006) findings regarding creative exercises, which help higher education students to develop beyond their cognitive understanding of a creative work to an effective outcome of enhanced self-confidence in their creativity. Based on survey responses collected by Reka, most of the PSTs stated that they were more confident at writing an academic article after attending Reka's class. I presented some of the PSTs' commentaries, obtained from Reka's initial and

final surveys, in Table 10 Although the PSTs did not mention the role of peer-review in their commentaries, it was evident that Reka's creative initiatives enhanced the PSTs' self-confidence and quality of learning.

Table 10 – PST's commentaries on their improved self-efficacy after attending Reka's classes

PSTs' Name	Elements of an academic article commented	Score and statement in the initial survey	Score and statement in the final survey
Mina	References following 6th APA format	15 'I am confused in writing references with APA style.'	30 'As we undertook this course and supervision, I now know the distinctive format of writing references for example in citing books, thesis, or journal articles. I found the topic on APA Style really helpful.'
Finny	Abstract	30 'Abstract is a concise version of an article. It is commonly written in Indonesian and English. I am not fluent in English thus I gave this score.'	60 'I wrote 60 because I think that I have a good ability in writing an abstract. I see that my abstract fulfils the criteria of a good abstract. I now understand what elements constitute a good abstract. An abstract consists of research problems, aims, methods, results, and conclusion. We need to mention our main finding and keywords.
Bila	Introduction	30 'This part should include my arguments in a straightforward way, or not beating around the bush. I also need to introduce the gap between the real-world application and expectation. However, I am not capable of writing it.'	50 'I understand how to write the introductory part of my article i.e., by explaining the core of problems. I think my article does not lose its focus. It demonstrates the gap clearly now.'
Pita	Methodology	125 'Writing methodology for me is always an overwhelming experience. I understand how to choose research instrument and design. Yet my biggest problem is in determining testing tool and data that I would like to obtain from my research.'	150 'I feel that I am capable in writing methodology after attending this class. I understand types of data. I am confident in deciding what data I would like to yield in my research.'

In Figure 34 I captured a moment when Aya helped two PSTs' troubleshooting the hinge movement of their pop-up book construction. The interaction between these PSTs and Aya involved higher order thinking and creativity because the problems experienced in designing the pop-up book required systematic investigation. This case illustrated Aya's weekly supervision meeting in her entrepreneurship course. Issues with folding the pop-up book, and other design troubleshooting, required the PSTs' persistence so that they put trust in their own creative process and avoided taking counterproductive strategies. This example shows an interplay between the elements of stimulating persistence and confidence and building autonomy within my mandala framework.

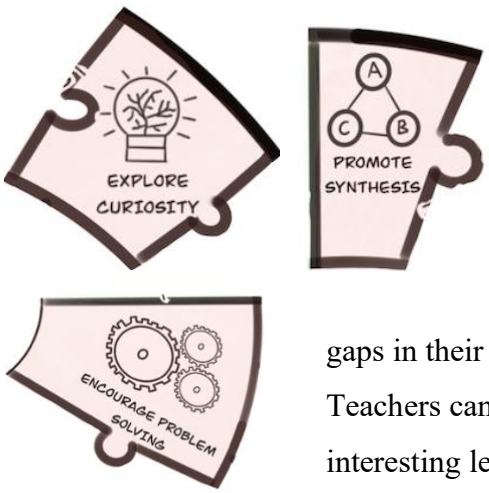
Figure 34 – Aya assisting two PSTs during an in-class supervision

Similar to Ryoo and Kekelis' (2018) study with youths to highlight challenges while making science projects, Aya drew on the PSTs' growth mindset, in which failure was celebrated as an opportunity to gain new skills. To develop the PSTs' confidence and persistence as they faced problems, Aya frequently delivered encouragement about the importance of the creative process rather than just the end product, as represented by her comment:

> You can do this. This project aims at sharpening your creativity to upcycle junk into instructional media. Some of you may find difficulties in folding, or failed in hardening the pages of your pop-up books. Others may encounter problems in collaborating with their group members due to other responsibilities or tasks. But I believe that failure is a part of every creative process. We, the lecturers, do not seek for perfection. Process is essential. (Aya)

The two interrelated puzzle pieces in the segment of teaching for creativity (stimulating risk-taking actions by the PSTs and building the PSTs' confidence), as indicated from my co-participants' praxis, induced the PSTs' capabilities for managing a level of uncertainty, which, according to Lamnina and Chase (2019), 'could lead to increased curiosity' (p. 1). This implies that uncertainties, including uncertain forms of pedagogy, should be embraced, rather than reduced, within classrooms as they provoke curiosity. In the next sub-section, I will explore ways my co-participants drew the PSTs' attention to uncertainties that led to increased curiosity.

Exploring and Awarding PSTs' Curiosity



Curiosity is one of the creative qualities valued highly by my co-participants, which accords with Daniels' (2013) opinions regarding teachers' inclination towards exploration of students' curiosity in creative classes. Curiosity emerges when students identify unexpected gaps in their meaning-making process (Loewenstein, 1994). Teachers can pique students' curiosity by organising interesting learning activities that allow students to practise the habit of questioning (Clark et al., 2019; Lamnina & Chase, 2019; Reeve, 2016). The exploring curiosity mandala puzzle piece works together with two other pieces in the ITE educators' praxis of teaching for creativity: encouraging problem solving, and promoting synthesis. Cases presented during problem solving activities were missing information – shaping an uncertain condition – in which the PSTs were expected to make sense and make predictions. When the PSTs resolved problems, my co-participants often asked the PSTs to transfer their knowledge in a form of synthesis – as demonstrated in the game of dice within Reka's class. Hence, there

was an interconnection between curiosity building, problem solving, and synthesis making in teaching for creativity. Further, the use of a certainty of response index (as described earlier when used by Ryan in his research methods class) enriched the PSTs experience by bridging their curiosity and constructing knowledge amidst uncertainties.

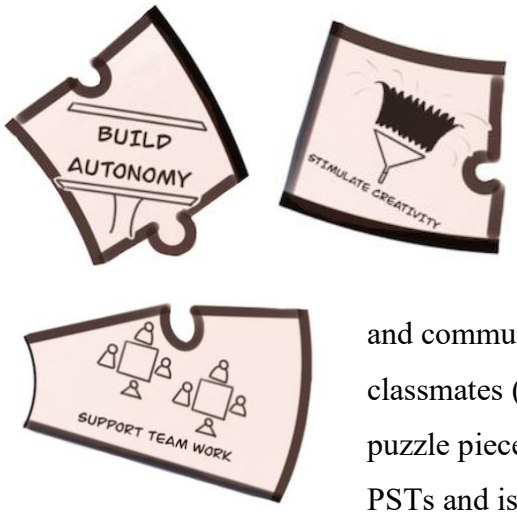
My co-participants consistently induced PSTs' curiosity by allowing the PSTs to experience new learning activities and by initiating a question-and-answer session, which recognised the ways of vitalising students' curiosity recommended by Clark et al. (2019) and Reeve (2016). As explained in the previous section on creative teaching, Reka designed learning activities that promoted problem solving and synthesis (dice game); Ryan began and ended his teaching sessions by brainstorming and including the certainty of response index activity; and Aya tried out *PechaKucha,* a presentation technique that stimulates problem solving. As an example of a strategy for exploring curiosity, Reka allocated a specific segment of his weekly lesson for PSTs to raise two questions regarding their upcoming field survey. Questions from individuals were then discussed in small groups, during which the PSTs determined one question to be a basis of their group investigation. Reka maintained the PSTs' curiosity by adding more elements of challenge to the group discussion. He asked the PSTs to reconstruct their questions and progressively build aims, significance, and methods of their CAR field survey, as reflected in his comment, 'If we must develop this question as a basis of our research paper, how would you proceed? What would be your aims? How are you going to design your research?' Reka's approaches of igniting curiosity demonstrated not only that he made curiosity personal, but he also approved learners to lead their knowledge construction.

The ITE educators rewarded the PSTs' curiosity by explicitly praising the results of their learning, as portrayed by Reka, 'I am happy to see a lot of red sticky notes here. I am aware that those students who were usually very quiet are now brave to speak up, even rebut their friends.' Meanwhile, Aya encouraged the PSTs to explore creative ideas for designing pop-up books during her weekly class, with the process of making the pop-up books themselves being completed outside of class time. To stimulate creative thinking about their pop-up book designs, Aya invited the PSTs to see their

projects differently, providing them with a doorway to a new vantage point and even guiding them to provide an alternate perspective to others.

As evidenced by these actions, the co-participants in this research demonstrated ways of unlocking curiosity. They not only provided a space for doubt and new curiosity to grow, but they also celebrated this growing curiosity by delivering explicit and implicit signs of appreciation. In the last sub-section on teaching for creativity, I will discuss the ITE educators' creative initiatives for developing another important characteristic needed for modern learners to face the uncertainties of the modern world.

Building Autonomy in PSTs for Accomplishing Creative Tasks



Another important feature of teaching for creativity is promoting ownership of the learning process, by which students determine how they are going to approach creative tasks, including how they are going to manage task loads, interactions, and communications between group members and classmates (Craft, 2005; Grohman & Szmidt, 2013). This puzzle piece represents the building of autonomy in the PSTs and is also interconnected to two other puzzle pieces: stimulating creativity and supporting teamwork. Creative tasks are defined as novel assignments to be completed by students to enhance and evaluate their learning, which involves processes and products (Snyder, 2013). Creativity in higher education is not merely about the capacity to innovate, it is a set of skills used to determine practical and workable approaches to existing ideas, which may generate new combinations (Amabile, 1998). Hence, creative tasks can be semester-long projects, journal writing, portfolio writing, or other exercises that cannot be completed by simply accessing information from the internet or books. The nature of such creative tasks enabled my co-participants to promote a sense of choice in learning for the PSTs, which, according to Wang et al. (2016), potentially enhances students' self-determination or autonomy.

The mandala framework puzzle piece for building autonomy was demonstrated in my co-participants' initiatives by providing learning environments that inspire creative growth and boost the creative potential of PSTs, extending on Morris' (2020) study on the role of educators in enabling creativity within self-directed learning. As signalled by the diagram in the beginning of this sub-section, building autonomy in the PSTs occurred simultaneously with two other puzzle pieces, namely supporting teamwork and stimulating creativity outside of the classroom. The notion of teamwork encompasses Tosey's (2006) peer-to-peer connectivity between the PSTs, where an individual's contribution is discernible. The three creative pedagogy strategies in focus here – building autonomy in the PSTs, stimulating the PSTs' creativity, and supporting teamwork – align with several personal qualities (e.g., creativity, independent working, working in a team, ability to manage others, good oral communication) needed by the PSTs in order to grapple with complex issues. According to Jackson (2006), these mental and emotional capabilities in university graduates are highly sought by employers.

The building autonomy feature of the mandala framework was demonstrated by Aya when she promoted environmental learning in her entrepreneurship class by allowing her students to choose their topics for their pop-up books. The PSTs developed their pop-up books in small groups (i.e., building teamwork) outside of the classroom and presented their progress each week. Aya collected input from the PSTs' presentations and audience feedback and used this data to adjust her instruction and supervision. It was evident that Aya practiced autonomy-supportive teaching through progress reporting and by synchronising peers' autonomy-supportive roles in her classes. Reeve (2016) defines autonomy support as 'interpersonal sentiment and behaviour the teacher provides during instruction, first to identify, then to vitalise and nurture, and eventually to develop, strengthen, and grow students' inner motivational resources' (p. 130). This finding aligns with a description of peers as providers of influential autonomy support for the development of self-determined motivation in learners by Guay et al. (2016).

As detailed in the previous section on creative teaching, Reka incorporated several creative tasks in individual and group work, such as brainwriting, dice games, and role-

play. Within this series of activities, Reka and the PSTs collaboratively planned, implemented, and evaluated the lesson of the day. These activities established a peer support component in Reka's classes as well, which involved reassurance and asking for, or giving, feedback to reinforce cooperative learning. This example demonstrates an interconnectedness in the different features of creative pedagogies in the mandala. Reka delivered specific and non-comparative feedback to each group of PSTs and he often assisted the PSTs in identifying potential learning challenges through his modified KWL strategy, as shown in his comments to students, 'A challenge that you may encounter in mapping species abundance is that you do not know the names of birds or plants. How are you going to approach this issue?' Reka's classroom features are consistent with Assor's (2016) portrayal of learning sequences, which enhance students' autonomous motivation for mastery of knowledge and skills. This is collaborated by one PST's comment, 'The series of learning offered in Reka's class increased my motivation in learning, especially in understanding our natural environment. I learnt about ecosystems, local culture, and application of modern technology, not only simultaneously but also critically.'

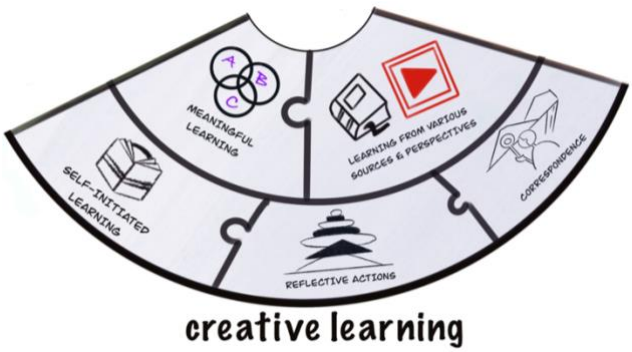
Reka avoided acknowledgement of conflict between PSTs during exhibition-like learning activities even though the PSTs mentioned that tensions arose in the class. Previous research by Wang et al. (2016) proposed that the absence of conflict acknowledgement might potentially lead to a controlling behaviour in learners, opposed to self-determined motivation. However, evidence of this controlling behaviour did not eventuate and further research is required to investigate this cause-and-effect relationship.

The three puzzle pieces – stimulating risk-taking/mistake making, exploring curiosity, and building autonomy in the PSTs – support the dynamic between two of Barnett's (2018) proposed university ecological zones: ecology of person and ecology of learning. It was evident that the teaching for creativity practised by the ITE educators went beyond epistemological transactions. There was clearly an ongoing pursuit of meshing innovative learning activities to advance the PSTs' capacity, agency, and academic identity as future teachers, encouraging what Barnett (2018) refers to as an ecology of

persons. Barnett's notion of ecology of persons encompasses forming relationships with learners and nurturing whole persons (including psyche and personal wellbeing). The three focus mandala features here framed possibilities for the PSTs to develop an openness to strangeness, to take risks, to venture forth, to expose themselves with learning creativity, and to work towards their authentic stances as learners (Barnett, 2020).

The three co-participants also advanced the ecology of learning within their university department through their teaching for creativity. They designed learning activities in which the PSTs could open themselves, reflect upon their learning, and practise self-understanding, aligning with Barnett's notion of nurturing students' own learning ecology. Ryan's use of the certainty of response index, for example, was an orientation to activities that could support the PSTs in interpreting their ecological self-awareness better, which supports Ellis and Goodyear's (2019) ideas about understanding 'good learning' from a pedagogical perspective. The ITE educators further facilitated a sense of learning community through teamwork – amidst differences, all PSTs had equal opportunity to learn and to be appreciated. The teamwork reflected a public sphere in society, resembling a space for collaborative learning and critical dialogue. This learning community supports Barnett's idea of the responsibility of an ecological university to mature its students.

Creative Learning and the Emergent Balinese Cosmology



The last element of my creative pedagogy mandala – creative learning – highlights the importance of reconnecting with indigenous ways of knowing through incremental creativity. Beghetto (2021) defines creative learning as 'the development of new and meaningful contributions to one's own, and others', learning and lives' (p. 474). Referring to Beghetto's definition, creative learning in this creative pedagogy mandala represents strategies adopted by the ITE educators to bring

different learning experiences to the classroom, to assist the PSTs to meet learning goals. The five features of creative learning were used by both ITE educators and PSTs when developing creativity and environmental awareness. These puzzle pieces illustrate how the dominant knowledge framework of creative pedagogy can be modified to include indigenous knowledge and practice. This directly responds to questions posed by Barnett (2018) about the possibility of including indigenous traditions into the dimension of knowledge ecology within university ecological zones. The features of creative learning in this research supported four of Barnett's (2018) university ecological zones, namely: ecology of knowledge; natural environment; persons; and culture. In this sub-section, I detail two major creative learning themes that emerged during my data analysis and discuss how Barnett's four ecological zones permeated these activities. The key creative learning features within the mandala framework of creative pedagogies for environmental learning are highlighted include:

1) performing reflective action in the class,
2) stimulating co-rrespondence among PSTs.

Performing Reflective Action in the Class

Positive evaluations of learning activities are implicated in creative learning in higher education (Barnett, 2020). Reka regularly opened his classes by inviting the PSTs to reflect on their previous class. He made reflective practice accessible to PSTs, which stimulated their consciousness of their learning (Brockbank & McGill, 2007). After the introductory workshop on creative pedagogy, Reka began bringing sticky notes to his classes as a way to structure this reflective practice at the beginning of his classes, 'Thank you guys for participating in this new kind of reflection, which I learnt from Mitha last week. So, we have a learning variation in our class.' He further described the potential benefit of sticky notes to the PSTs, 'The sticky notes themselves automatically limit your wording while doing reflection so you will learn how to produce a succinct reflective statement.' He developed this new model of reflection to not only motivate PSTs to share their opinions, but also to enact reflective practice himself by responding to PSTs' sticky notes as described earlier in the section on trying new ideas.

Reka created a conducive climate for reflective dialogue where he promoted the PST as a 'knower' and 'reflective practitioner' of their learning experience (Brockbank & McGill, 2007). Some PSTs were reluctant in writing their reflections, which was demonstrated by one of the PSTs asking, 'Do we need to put our names on these sticky notes, Sir?' In light of this hesitation, Reka expressed encouragement and reassured the students that his class was a safe space to practise self-reflection, 'You do not need to put your name. Just write your statements and stick them on this whiteboard,' and 'PST#1, write your opinion not your friends' opinion. Please don't be afraid. Then stick them here, please.'

Besides inviting PSTs to complete reflective actions in his classes, Reka asked them to produce weekly electronic portfolios to submit via Google Class. With this reflective practice, Reka attempted to deepen PSTs' learning quality through critical thinking, such as questioning, understanding of one's learning process, and owning the learning itself, which accords with Threlfall's (2014) proposition on electronic journals being a form of reflective practice in higher education. Reka further used the electronic portfolios as a platform for collaborative learning, where PSTs read and commented on each other's portfolios. This corresponds to Roberts et al.'s (2016) recommendation on creating collaborative assets through e-portfolios. Reka also tailored the electronic portfolios to act as a summative assessment method. Hence, Reka awarded marking to the PSTs' portfolios to encourage their reflective practice. He elaborated:

> It was hard earlier in the year; some PSTs returned the portfolio merely with one or two words. As we practiced this type of reflection, they submitted more chain of words. I then assessed these portfolios and marked them. I gave 1 for the question since it is only about remembering information. I gave 1 to the statement 'things that I have not got' and 2 to PSTs' suggestions. The total score will be 4, which represents A. (Reka)

In the meantime, Aya and Ryan chose to enact reflective practices through brainstorming at the end of each session. According to Grohman and Szmidt (2013), brainstorming is a creative action as it helps students use their intuitive methods of problem solving. Aya and Ryan instigated a period of question and answer for approximately 10 minutes before they suspended their classes. The following

observation was recorded in one of Aya's class, where she had used a prompt to trigger self-evaluation in the PSTs, discerning opportunities for improvement, and planning a way of learning forward.

Class observation note: 10 May 2019, 19.45-21.30

Reflection was delivered by Aya in relation to PSTs' PechaKucha presentation:
- The slide design in general.
- PSTs could alter their plans from week to week.
- How to create stronger message on their pop-up books (e.g., a big picture completed by some tiny details and information corner).
- More attention to font type, size and color. PSTs could use their handwriting too.
- Topics which were too broad or general needed to be made more specific.
- Thread could be used to make background or big pictures on pop-up books stand stronger.
- What to prepare for next week (the design of the first page of their pop-up books).

On one occasion, Ryan launched a polling through GoSoapBox to elicit PSTs' opinion about his statistics class. According to Carroll et al. (2018), the use of GoSoapBox not only promotes in-class engagement of students in higher education, it also improves individual learning experiences. In the polling, Ryan asked the PSTs to rate their understanding through the question, 'Was this SPSS class easy to understand?' and provided a 6 Likert scale response option. All PSTs reflected that they had gained an understanding during the class, with 43% of the PSTs rating the session as 'interesting and I gained understanding,' while 57% stated that the class was 'very interesting and I gained understanding' (Figure 35).

Figure 35 – The voting result in one of Ryan's classes

In this sub-section, I discussed how individual, dialogic and collaborative reflections were embedded in the ITE educators' classes as creative learning strategies. As mentioned earlier, Reka's use of sticky notes offered a creative space for the PSTs to recall their previous learning experience, capture their learning progress, and generate purposeful thinking to advance their meaning-making. Reka's strategy also indicated these reflective actions were creative outcomes from his own learning. This is like Ryan's use of a new platform for electronic engagement – Ryan's reflective action exemplified his active learning endeavour driven by his interest in technology-integrated teaching. I now turn to the last key feature of creative learning (stimulating co-rrespondence among PSTs), where the Balinese philosophy of sharp thinkers and cosmology were evidenced.

Stimulating Co-rrespondence Among PSTs

Environmental learning, as demonstrated by the group of ITE educators involved in this research, refers to Sterling's (2009) higher-order learning categories towards an ecological consciousness and competence: 'respons-ibility' (an expanded and ethical sense of engagement); 'co-rrespondence' (a closer knowledge match with the real world); and 'respons-ability' (the ability to take integrative and wise action in context) (p. 115). In this section, I focus on co-rrespondence, which I interpret as a form of building connectedness with the local environment, including experiences and expressions of empathy, respect, and compassion for other people and living creatures, which, from an indigenous perspective, is identified as 'a need to re-connect and re-engage with the wisdom of their people and their lands' (De Souza & Watson, 2016, p. 337). A strong need for accommodating PSTs' co-rrespondence was conveyed by all three ITE educators during the introductory workshop on creative pedagogies. Reka, for example, highlighted this importance as, 'I would love to invite PSTs to connect or make a link between concepts of ecology they learnt in class with our local concept, such as *abian* (the traditional concept of dry lands farming in Bali) ecology.'

A person's worldview answers four fundamental questions about life, such as origin, meaning, destiny, and morality (Zhang & Wu, 2016). As traditional knowledge is predominantly generated through observation of the natural world from a global point of view (Iaccarino, 2003), co-rrespondence within my co-participants' classes helps PSTs discover a complex view of nature while (re-)familiarising themselves with their Balinese philosophy. My co-participants demonstrated co-rrespondence within their classes by organising creative learning activities that not only encouraged PSTs to nurture their intrinsic motivation to commit environmentally friendly actions, but also invited them to re-connect with the local community and nature. For instance, the PSTs visited local beaches to observe varieties of birds, and interviewed local farmers to design a place-based learning plan for their teaching practicum. These initiatives challenged Stables' (2009) notion that creativity and environmental learning are 'silent

partners' in an educational context 'where the priority for one has muted the other, either explicitly or by default' (p. 200).

Co-rrespondence became an imperative in my co-participants' classes as it provided a bridge to Balinese culture and worldview within a university attended by participants with cultural and social diversity (Walker & Gleaves, 2008). According to the university guidelines, co-rrespondence has been a directive implemented by ITE educators for more than a decade. Moreover, the program head noted that PSTs in urban environments might have less opportunities to adequately experience nature and outdoor learning (Bone, 2016). By revisiting their cultural heritage during the creative pedagogy research activities in this study, there were increased opportunities for PSTs to forge new identities and enhance their capacities as whole people (De Souza & Watson, 2016), exemplified by one of the PSTs' comments:

> Reka's creative pedagogies facilitated the development of my knowledge, attitude, skill, and ecological awareness as together we learnt about the function of our *subak* ecosystems and application of modern technology simultaneously. I now know how to make compost as we learnt about it with farmers in a *subak* site. (Tira)

One of Reka's classes epitomised Althaus' (2020) proposition of the exploration of indigenous ways of being and knowing as an approach for meaningful community engagement. PSTs who attended Reka's class were in their final year, and were required to prepare an individual research project. A quarter (6/24) of the PSTs were interested in researching environmental learning – known in the faculty as Science, Technology, Society and Environment (STSE) – by focusing on education related to various topics, including (1) rice-duck integrated farming system in *subak*, (2) photovoice-based learning to stimulate place-based education on *subak* systems, and (3) *subak* and sustainable development in PSTs learning communities. It is evident that Reka's initiatives of incorporating environmental learning in his classes from the PSTs' first years has raised the PSTs' engagement, interest, and awareness of Balinese indigenous ways of knowing and their connectedness to the local community and traditional ways. As explained earlier in this chapter, Reka had been making connections to the local environment in his teaching before his involvement in this research. The impact of his

sustained teaching practices linking to the local context was evident through 25% of PSTs choosing to focus on Balinese knowledge within their research project.

Balinese people practice their sense of cosmology through regular rituals that are aligned with their traditional calendar. As an example, Balinese people celebrate *Tumpek Uduh* every 210 days as a milestone marking the preservation of native plants on a household basis. They also celebrate *Tumpek Kandang,* a ritual honouring pets and domestic animals. These rituals illustrate their life philosophy of maintaining amicable connections with both the great, and small, universes. Early in this research Reka mentioned how these Balinese practices could be reintroduced for environmental learning:

> Ethical, spiritual, and religious values are inseparable, as the concept of *Satyam Shivam Sundharam* (translated as 'The Truth, The God, and The Beauty') illustrates. *Tumpek Uduh* should be interpreted as consciousness towards our environment. During this celebration, we stress a tree by scratching it. This approach will stimulate the tree to produce the hormone of flowering. Sometimes this aspect of ethnoscience is forgotten [when] people present offerings to plants without scratching. As reflected in the New Ecological Paradigm (NEP), human is subject to the laws of nature. We need to understand this interrelatedness between social, economic, ecological, and cultural aspects in ESD (Education for Sustainable Development). (Reka)

As Reka's comment above indicates, there was a very strong motivation demonstrated by the ITE educators to connect and accommodate environmental learning into future classes – to orientate their PST students towards the Balinese way of co-rrespondence. I discovered that the Balinese concept of cosmology was encapsulated within my co-participants' teachings of environmental learning, in which they sought to harness the PSTs' three dimensions of mind identified in Balinese cosmology, namely *manah, buddhi,* and *ahamkara*. In the follow sub-sections, I depicted the co-participants' understandings of the three elements of humans as a little universe (*manah, buddhi,* and *ahamkara*) and how these perspectives were enacted by my co-participants to achieve what the Balinese people refer to as sharp thinkers.

Manah: The Processing Mind

In the context of learning, the Balinese philosophy *manah* (the processing mind) should be stimulated by cognitive inputs before learners can move forward to the next mind functions, such as making decisions (regulated by *buddhi,* the higher intelligence mind – note refer to the detailed explanation of Balinese cosmology in Chapter 2). The next few paragraphs describe the ITE educators stimulation of the PSTs' cognitive processing (*manah*) through creative pedagogies for environmental learning.

Reka stimulated *manah* by applying various learning approaches, including classroom discussion, before proceeding to group investigation, participatory videos, and place-based learning. He incorporated Science, Technology, Society, and Environment (STSE) to introduce the interdisciplinary nature of local socio-scientific environmental issues, consistent with the utilisation of STSE as a strategy to prompt critical decision-making for PSTs in the future, as proposed by Gresch et al. (2017). During *manah* stimulation, there was a shift of knowledge transmission from Reka to knowledge construction by the PSTs, as discussed by Aikenhead (1992).

Also noticeable was Reka's inclusion of reflective thinking strategies to support the PSTs' thinking development throughout the semester, resonating with Renee et al.'s (2020) view that reflection in environmental learning is important for building a deeper understanding of environmental problems. In the following individual reflective note, a pre-service teacher recorded his impression of Reka's course meeting. This reflective account illustrated how class discussion and reflective journaling had given the experience of *manah* stimulation, which has also prepared him for higher cognitive processes in the domain of environmental learning:

> I understand the connection between science, technology, society, and environment (STSE) now. Science is conventionally delivered as a pure and separate entity from its physical and social environment. It should cover an aspect of comprehension about degrading environmental issues, including global issues, and quality of life. STSE needs to be combined with multicultural democratic values. I am aware of challenges for implementing STSE in our classroom, namely values and beliefs, knowledge and comprehension, a lack of time and resources, and pedagogical approaches as well. A question remains about how to apply STSE innovatively to attract students who prefer social media to nature. (PST)

In a class session of an ecology course, Reka organised a game to stimulate PSTs' *manah* in making associations between ecology concepts. He divided the PSTs into three groups, which were named after ecology aspects: floristic, physiognomy, and bird watching. Each group listed six words associated with their group name on the whiteboard. Then, my co-participant gave dice to each group. He requested the PSTs combine three words that were previously listed on the whiteboard into a comprehensible synthesis, according to numbers shown on their dice. Reka's discussion at the end of the game supported the idea of *manah* stimulation in this learning segment, 'The activity you did was not merely a dice game but a way of understanding the ecosystem linkage; it was designed to assist you in remembering that an ecosystem is connected to another.' I noted in my observation that the game not only awakened the PSTs' sensibility about the nature they lived in, it also enhanced the PSTs' understanding of biodiversity and species abundance mapping.

Meanwhile, Aya kindled *manah* in her entrepreneurship course by presenting a *PechaKucha* on local environmental issues. In this session, PSTs actively listened to Aya's *PechaKucha* modelling while simultaneously writing a short response paragraph (100-250 words). Before presenting her *PechaKucha*, Aya outlined the aim of this *manah* stimulation, 'I'd like you to imagine some ideas of entrepreneurship that are feasible for you. Common ideas are selling culinary products but entrepreneurship is not all about food selling. A group of pre-service teachers could provide a tutoring service.' In the following weeks, the PSTs presented their *PechaKucha* containing a plan of their craft project. It was evident in Aya's class that *PechaKucha* offered a practice of self-regulatory cognitions and autonomy for the PSTs. It conforms to what Richards (2018) refers to as 'dual self-regulated learning and teaching roles' within the practice of *PechaKucha*, and develops the PSTs' sense of agency and teaching competencies. I recount in my class observation my impression of this *manah* stimulation, 'Vivid and interactive presentation where connections between local environmental issues and the PSTs' surrounding were made.'

In a course on research methods, Ryan stimulated the PSTs' *manah* by showing three distinctive pictures: (1) a canoe full of rubbish in the middle of a mangrove forest, (2) the reclamation of Benoa Bay (a 1,243.41 hectare maritime conservation area where a tourist resort and a racing circuit were going to be built), and (3) Ngurah Rai airport expansion, which has affected the surrounding mangrove forest. He proposed the idea of incorporating these cases into qualitative research topics that could be undertaken by PSTs. As illustrated in the excerpt following, PST #1 and PST #2 were not aware of a local environmental issue. Ryan then guided the PSTs by introducing a space for exploration of environmentally related research. In this case, Ryan demonstrated an embryonic example of filling a gap in teacher preparation programs, especially between academic teaching and research training for adopting an inquiry-oriented approach regarding environmental education, as described by Malandrakis (2018):

Ryan:	A ship is transporting trash. See the second picture now, what is it about? A case which has been happening in Teluk Benoa.
Students:	… [confused and talking to other students]
Ryan:	[giggled]
PST #1:	Pollution?
PST #2:	Illegal fishing? [some laughed]
Ryan:	[laughed]
PST #3:	Reclamation?
Ryan:	Yes, reclamation. We rejected this reclamation project, yet we can see the reclamation is still going on. You will still see soils are being excavated on your left and right side as you passed the highway. Do you think it is possible to write about these topics for your qualitative research? There are several points of views you can focus on, such as students' perception, students' interaction, classroom management, and teachers' ways of managing their classes if they decide to include environmental issues.
PST #4:	An analysis of students' behaviours towards topics of environmental issues?

The above four examples of *manah* stimulation illustrate the key findings in this particular aspect of provoking co-rrespondence among the PSTs (the spotlight feature in the mandala in this section): embedded *manah* (cognitive processing activities) are oriented to an inquiry approach, as the nature of *manah* is to question and doubt. My co-participants provided strategies for navigating knowledge transfer to knowledge creation, to encourage reflective thinking, and to assist the PSTs in making associations

between concepts. Games, problems, and a selection of presentation techniques were cognitive inputs that supported the shaping of PSTs' *manah* in the context of exploring creative pedagogies for environmental learning. These examples of *manah* stimulation covered free thinking activities, which resonates with Wallas' early orders of creative process interpreted by Sadler-Smith (2015), namely preparation and incubation of creative thoughts. The preparation stage in those learning activities required conscious work from the PSTs through thought construction, while the incubation stage occurred in a non-consciousness state as a continuation of their cognitive processing. For the ITE educators, those *manah* stimulation activities were the final stage of their creative process (verification) within the sociocultural domain that is their classrooms. Wallas' verification stage requires experts to serve as gatekeepers in the field; however, the creative value of the ITE educators' pedagogies should not be merely subject to peer reviews. In this CPAR, the PSTs were more than an audience with whom the co-participants interacted – the PSTs experienced, and rated their experience of, the co-participants' creative pedagogies, creating dynamics which constituted the verification stage.

My co-participants' involvement in *manah* stimulation represented their understanding of the importance of making connections with the PSTs' life-world (space and time). There were four forms of relationships within the PSTs' life-world that were integrated in learning activities, depicting Jarvis' (2006) first element of learning: the-person-in-the-world. This element encompasses building interpersonal relationships to create harmony with the learners' knowledge of the world. *Manah* stimulation not only envisaged a sense of becoming through engagement with new information – both ITE educators' and PSTs' – it also reflected upon their past learning. This person-in-the-world interrelatedness of *manah* stimulation – of the PSTs' co-rrespondence – is evidenced in the co-participants' classes shown in Table 11.

Table 11 – The person-in-the-world as depicted in the co-participants' manah stimulation (informed by Jarvis, 2006)

Class discussion	Person to Person	I ⇔ Thou
Game	Person to Phenomenon	I → It
PechaKucha	Person to a Future Phenomenon	I → Envisaged It
Reflection	Person to Self	I ⇔ Me

Manah stimulation, implemented by my co-participants, embodied their central position for circulating knowledge, with its multimodality in this digital age. It was evident that my co-participants considered environmental learning as 'what counts as knowledge in the contemporary world' to complement subjects they taught (Barnett, 2018, p. 56). This finding demonstrates the expanding ecological potential of a university to connect environmental learning and various courses it offers. This extension recognises the power of universities in enhancing the wellbeing of the world through their knowledge ecology of a society, or in this research, the society of Bali.

In the following sub-section, I describe the stimulation of PSTs' higher intelligence, known as *buddhi*, within my co-participants' creative pedagogy praxis in connection to the PSTs' co-rrespondence.

Buddhi: The Higher Intelligence

In the domain of environmental learning, cognitive and affective dimensions are continually embraced, and brought into an experience, to build students' sense of relationship with their environment (their co-rrespondence), hopefully leading to informed actions (Littledyke, 2008). I draw on examples of my co-participants organising environmental learning to activate PSTs' heightened awareness (*buddhi*), within the sphere of pro-environmental action, although I acknowledge a change of ecological worldview is not an adequate predictor for pro-conservation actions (Shephard et al., 2015).

Reka stated that his teaching praxis focused on providing deep cognitive learning that integrated affective domains. He combined place-based learning, experiential learning, and cooperative jigsaw activities to convey a pro-conservation message in his classes, which is an uncommon combination in pedagogies of place (see also Tooth & Renshaw, 2009). Reka amalgamated four different lenses – social, cultural, ecological, and economic – in one of his courses (units of teaching) to assist PSTs to investigate the interrelatedness between biotic and abiotic components in an ecosystem. He required PSTs to conduct and report on community-based participatory research projects that encompassed *subak* (a Balinese ancient cooperative farming practice). He stated that this approach supported the development of PSTs' higher intelligence in ecological literacy or eco-literacy, similar to what Capra (2007) refers to as an appreciation, and comprehensive understanding, of one's complex living systems (e.g., ecosystem and human social system).

Figure 36 – Anita's photovoice on subak Sembung from four different lenses

This eco-literacy development in Reka's students is exemplified by PST Anita's project work. Anita built her understanding of a local community's perception of the *subak* ecosystem through a community-based participatory research project (Figure 36). Anita engaged in the photovoice method to obtain meaning from her local environment, aligning with Heimlich and Horr's (2010) characterisation of making meaning around natural objects in free-choice environmental settings. She constructed appreciative and

receptive forms of reflection at the end of her observation, which demonstrated her awakening to *buddhi,* or her higher intelligence, stimulating a co-rrespondence. This finding is supported by Kurisu's (2015) postulation that knowledge about the meaning, procedure, and effectiveness of a particular behaviour impacting the environment, is an influential factor in committing to pro-environmental actions. It was evident in Anita's final report that the research project series of learning activities increased her eco-*buddhi* (eco-awareness) and thus her likelihood of following-up with pro-environmental actions:

> Ecologically speaking, both research participants [community participants in her research project] and I had the same understanding about *subak* Sembung. The difference existed in the use of language expressions. For example, I could articulate the interaction between biotic components of *subak* and the *subak* site itself, the advantage of mixed vegetable gardening as well. Meanwhile, the participants illustrated the scenery of this rice field and eco-tourism. From the social perspective, both of us tended to look closely at how farmers in the *subak* site interacted in collaborative works. Culturally speaking, we discussed the function of shrines such as *Sanggah Catu*, which was a vital concept of *Tri Angga* in the Balinese Hindu community. We used the economic lens to suggest how better management of the *subak* site would lead to better yields, such as the amount of harvest and daily income. In this case, eco-tourism might be included since farmers would gain more income from selling food and drinks for visitors. The participants stated that this photovoice activity nudged them to maintain the balance of the ecosystem, be it respecting collective works, practising farming culture, or avoiding selling their lands. (Anita)

Activities in each of Reka's class sessions served an equal opportunity to grow both personal intellectual disposition and like-mindedness, or what Dewey (2010) refers to as a common understanding in a learning community. This design allowed PSTs to formulate environmental learning experiences and social disposition via communication of a shared purpose and an exchange of thoughts, even feelings. Surya, a pre-service teacher, stated in the survey that she liked how Reka's pedagogical approach deepened her sense of place. Her response further portrayed how connecting students with their places engaged more than an intellectual comprehension, aligning with Orr's (2013) position on the development of ecoliteracy through place connectedness:

> His pedagogical approach did not only encourage us to take a proactive approach to learn, but it also pushed us to immerse in our environment following the learning topic presented in class. It has widened our perspectives about nature. His pedagogical approach has moved us beyond classroom theory. (Surya)

Reka incorporated individual reflection in learning activities, further stimulating *buddhi* and co-rrespondence. He asked the PSTs to share, and discuss, their individual reflections in the classroom by responding to three statements: things I learnt from our last meeting; things I did not grasp from our last meeting; and questions I have for our next meeting. Responses were recorded on different coloured sticky notes, with colours assigned to certain types of questions. This modified Know-Want-Learn (KWL) strategy assisted the PSTs to organise their thinking by activating their prior knowledge, asking questions, and reviewing their environmental learning, consistent with Greenwood's (2019) study of using KWL grids to support students' ownership of learning. Some PSTs indicated positive attitudes towards this strategy:

> In my opinion, this technique was appropriate for environmental learning as it invited students to deliver their succinct ideas on sticky notes, and other students read these ideas. (Ana)
>
> This was a creative way of making us think actively. My lecturer has been applying this for a while. Lately, I am more relaxed in learning, and of course, since I am relaxed, I absorbed a lot of things. (Mila)
>
> This was such an interactive learning. We were encouraged to actively practise and demonstrate learnt concepts. We were asked to think about what we were doing as well. (Christian)
>
> There is always a change within me, in terms of attitudes and skills in doing these tasks. (Gede)
>
> We unconsciously taught each other. Besides, at the beginning of this course, we were given guidelines to assess our learning and expectations for today's meeting. (Nola)

All ITE educators modelled responsible pro-environmental behaviour within their teaching. Reka's uncommon combination of pedagogies that stimulated the PST students' co-rrespondence with their local environment enhanced their *buddhi* (heightened awareness or reawakening) to creative learning. Another example of this sort of modelling was when Ryan demonstrated his mindful use of paper; for instance, he distributed worksheets that were printed on used paper. Shephard (2008) values Ryan's explicit initiative, which is often avoided in higher education, to inform and influence the PSTs to behave in this particular manner. It will also be recalled from the

‘trying new ideas’ puzzle piece that Ryan highlighted more ethical ways of catching dragonflies. Ryan’s examples indicated that co-rrespondence with a natural system could not be achieved without maintaining responsible relationships with our local environment and animals.

Aya demonstrated a similar approach in her entrepreneurship course. She scaffolded the PSTs’ learning from *PechaKucha* presentations to pop-up book creation. Her praxis echoed Ruggiero’s (2017) procedures for interweaving theoretical course content, re-purposing actions, and folding paper manipulation. Recognising the need for creating an educational product differently, Aya encouraged the PSTs to re-purpose household waste into children’s pop-up books. Some of the reused waste included straws, cigarettes, plastic bags, brochures, book covers, and calendars. Various themes about local environmental issues were both narratively and visually implicated in this project. The following PSTs’ survey contributions represented their valued learning elements within this project:

> This course combined environmental learning and entrepreneurship to spark our awareness towards our local environment condition. (Buda)
>
> As a prospective teacher, I think I can contribute to preserving my environment. (Nia)
>
> We are now able to design and create pop-up books about the environment. Shortly, we are going to be more aware of our surrounding. (Gus)
>
> This project promoted the 5Rs (recycle, reduce, reuse, reject, repair). We grow our awareness of our environment. We could create pop-up books about our environmental issues as well. (Ida)

In the ecology course, the environmental themes that were developed stimulated the PSTs’ *manah* (processing) activities. Reka arranged outdoor learning events in three distinctive places, which also stimulated the PSTs’ *buddhi* (heightened intelligence) about their co-rrespondence with nature. As an example, the PSTs investigated biodiversity and species abundance through mappings in a mangrove forest. Reka grouped PSTs into two specialisations: birds and vegetation. He requested that each group conduct three independent visits to any of these sites: *subak*, mangrove forest, or urban forest. He facilitated the first mangrove forest visit to demonstrate his skill of

observing nature (Figure 37a) and his ability to listen to birds' chirps to identify their species (Figure 37b). It was evident that my co-participant aimed to cultivate empathetic qualities in PSTs to allow them to better understand their surrounding environment, resonating with Goralnik and Nelson's (2017, p. 701) proposition about changing environmental learning practice, which involves a movement from 'a romantic view of the natural world and environmental problems to a reflective and empathetic relationship with the natural world' (p. 701).

(a) **(b)**

Figure 37a – Reka was explaining a way to use a clinometer to measure tree height; 37b – Reka was demonstrating ways to identify a bird by listening to its sounds in the early morning

Concept mapping was the basis for the development of a higher-level assignment in the form of a final report. Reka used concept mapping to develop PSTs' skills in formulating critical elements of a concept, balancing spatial arrangement, and presenting the big picture, as described by Moon et al. (2011). Ayu, one of the PSTs, created a concept map that encompassed an avifauna profile in an urban ecosystem (Figure 38). Her concept map is an example of how the three skills (formulating critical elements of a concept, balancing spatial arrangement, and presenting the big picture) were sharpened, and that her high-level analysis thinking (*buddhi*) was engaged. Green shapes represent records of 36 species of birds in three distinctive habitats, namely mangrove forests (6 dominant species); rice fields (4 dominant species); and parks (6 dominant species). She drew yellow shapes to describe how society's level of local income influenced the distribution of bird species in the urban ecosystem. She found a

richer avian diversity in the living environment of local areas with higher incomes and correlated avian abundance with two types of habitats, namely local habitat (the most productive part of the city) and landscape scale (a city function as an ecosystem). The lighter green shapes inferred tools for estimating avian diversity. She stated that avian species richness could be counted by applying jack-knife estimators, while bird density was measured by combining the Simpson's Diversity Index with the Shannon-Weiner Diversity Index.

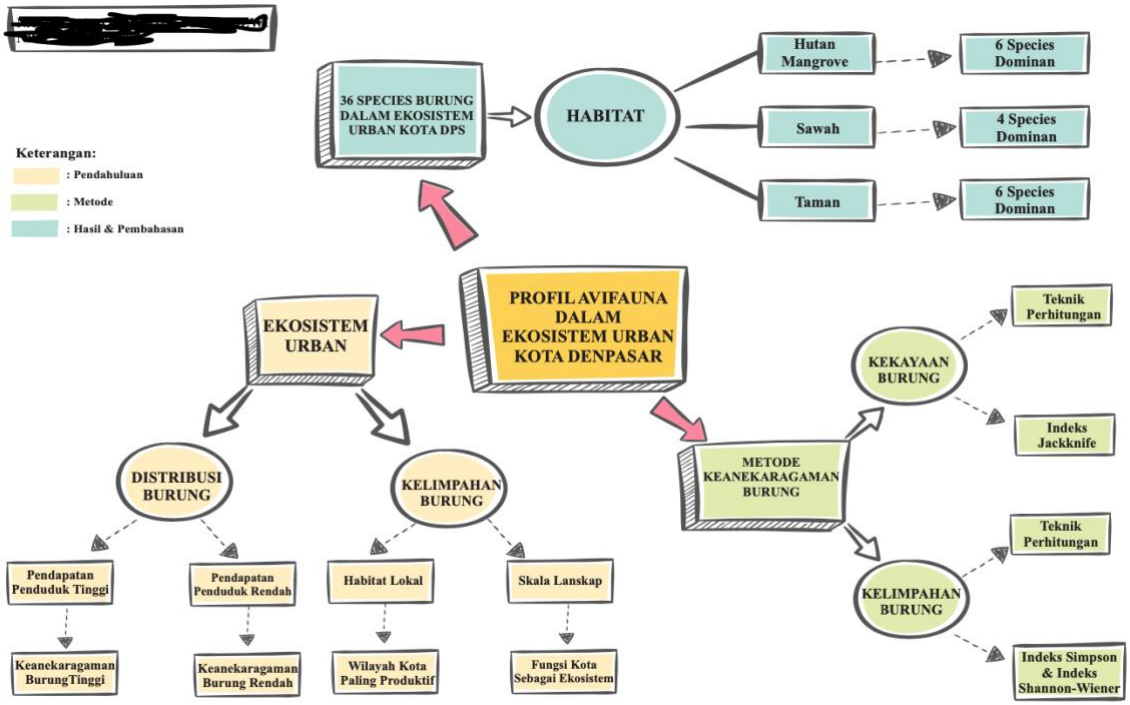


Figure 38 – Ayu's concept mapping of avifauna profiles in an urban ecosystem in Denpasar

Ayu's short reflection showed her interpretations of this place-based learning experiences and an articulation of future endeavours. She developed a sense of relationship with the place she observed, evidence of her growing *buddhi*, as she learnt that birdwatching should be best done in different seasons. This awareness potentially informed her decision for birdwatching timing, for the purpose of completing her bachelor's thesis or for recreational purposes. Her short reflection also demonstrated how her intellectual faculty that judges the strength and weaknesses of her observations towards nature had been stimulated, signalling *buddhi* or an awakening:

> There were some advantages and disadvantages of surveys that had been carried out. The survey provided analysis and publication of a variety of species which existed in the Mertasari coastal mangrove forest area. The weakness of this method was a lack of the observer's experience. Thus, some birds could not be identified. Another drawback was that the observer conducted this survey only in one season. The observer's suggestions for future research regarding analysis and inventory of bird species in Mertasari mangrove forest area are (1) researcher must be more knowledgeable about types of bird; (2) researcher must bring a diverse source of literature to support maximum identification; (3) researcher must carry the observation for more than three times and in different seasons. (Ayu)

Another final report, submitted by PST Agus, captured a skilful observation of natural patterns. He presented a three-week investigation of two mangrove forests' physiognomy and plant species profile. The results of his observation can be seen in Figure 39 and Figure 40. He drew the position of plants, the shape of plants, and the distance between the plants and the built features of a bridge and houses in the observation area. Seven plants recorded in his mapping were (a) *lamtoro*, (b) *ketapang*, (c) mangrove, (d) fir, (e) *pandan*, (f) bougainvillaea, and (g) shrubs (Figure 41). As evident in his drawing, Agus' botanical awareness gradually developed, which gestures towards Stagg and Verde's (2019) notion of scientific drawing as a learner-centred approach for constructing botanical knowledge with a minimum reliance on information transfer. Like Ayu's short reflection, Agus' drawings were the result of his growing sense of connectedness – his co-rrespondence – with the environment he had been observing. Although both students' task materials could not demonstrate how Ayu's and Agus' ecological worldviews changed, or why informed actions were taken during this data collection, they do indicate how a series of learning experiences in the ecology course could raise the PSTs' consciousness towards their surroundings.

Figure 39 – Agus' transect diagram of the mangrove forest I

Figure 40 – Agus' transect diagram of the mangrove forest II

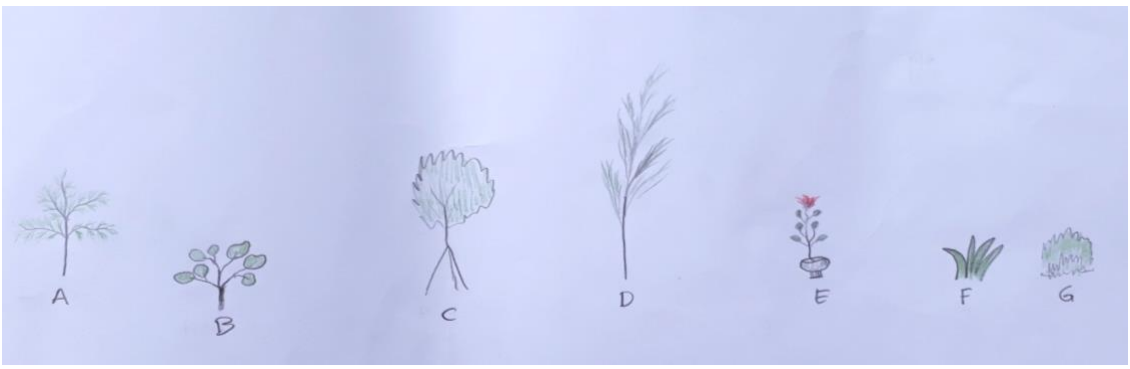


Figure 41 – Types of plants recorded by Agus in the two mangrove forests

In this section, I describe the ITE educators' strategies for stimulating the PSTs' co-rrespondence – deep cognitive learning, individual reflection, re-purposing actions, outdoor learning, and explicit demonstration of pro-environmental behaviour – to engage with the PSTs' *buddhi*. The predominant purpose of the creative pedagogy for environmental learning activities, designed by my co-participants, was to assist the PSTs to gain meaning of a relevant segment of their life-world: their local environment. My co-participants brought a series of learning experiences to their courses, which, according to Jarvis (2006), guides the PSTs to think, feel, and potentially act on, their local environment. The PSTs, as the individuals experiencing the world, were exposed to environmental issues through various modes of learning – informal, emotional, silent, visual, and tactile – creating the sensation that the harmony of their world was disturbed. These 'disjunctural situations' created a sense of consciousness about our fast-changing world (Jarvis, 2006, p. 16). Strategies, such as problematising our life-world, may be useful for reshaping learning in post-COVID-19 and climate change contexts and for stimulating a transformation of the person for the changed world. Some disjunctural situations found within my co-participants' courses are depicted in Table 12, where the person-in-the-word interrelatedness *buddhi* stimulations of the PSTs' co-rrespondence is evidenced in the co-participants' classes, as shown in Table 11.

Table 12 – The person experiencing the world as depicted in my co-participants' buddhi development (informed by Jarvis, 2006)

Community participatory research	Person to Person	I ←//→ Thou
Individual reflection	Person to Self	I ←//→ Me
Outdoor learning	Person to Phenomenon	I --//→ It
Explicit initiatives	Person to Person; Person to a Future Phenomenon	I ←//→ Thou; I --//→ Envisaged Thou or It
Concept making	Person to a Future Phenomenon	I --//→ Envisaged Thou or It

Learning activities to develop the PSTs' *buddhi* were not designed to encourage competitiveness and economic gain among the students. It was apparent that these

learning activities not only engaged the PSTs at an individual level, but also at a societal level, to promote what Barnett (2018) refers to as 'lifewide learning', or learning in various spaces (outdoor and indoor learning) and settings (formal and informal learning). As the PSTs were invited to connect with their local communities, my co-participants' endeavours to nurture the PSTs' *buddhi* presented strategies for advancing learning ecologies for both students in higher education, and the wider society. The combination of outdoor learning and community participatory research, for example, opened mutual learning spaces among academics, students, and local communities within the public sphere.

My co-participants' creative pedagogy praxis in developing *buddhi* also demonstrated their role as ecological agents since their teaching and learning were nature-inspired and oriented. This finding implies an intentional link between pedagogy and the natural environment ecosystem, which, according to Barnett (2018), is crucial for maintaining or meeting universities' ethics of environmental activism. The endorsement of *subak* as a theme of learning, as depicted in my co-participants' courses, further interweaves the cultural ecology within the university. *Subak,* as the chosen cultural sphere, gained 'dispositions of care' from both ITE educators and PSTs in this study, manifesting Barnett's (2018) proposition of a 'culture of concern' in order to establish an ecological university (p. 65).

In this section I described how creative pedagogies presented opportunities to ensure environmental learning happened beyond the PSTs' initial cognitive dimension and into a higher-level awakening of their co-rrespondence with natural systems. The mandala features of stimulating co-rrespondence and spotlighting *buddhi* pertains to the co-participants' endeavours in (re-)connecting PSTs with their life-world (local environment settings) and demonstrating explicit examples of pro-environmental ethical behaviours. The PSTs' heightened awareness towards *subak* was evident within their task materials. I now turn to the last part of exploring the notion of micro-cosmos, as evidenced in my co-participants' environmental learning, reflected in their sense of identity, and known as *ahamkara*.

Ahamkara: The Sense of Identity

It was evident in my co-participants' classes that *ahamkara,* or the personal accumulation of embodied learning that controls one's feelings and actions (see the detailed explanation of Balinese cosmology in Chapter 2), was gradually shaped by the ITE educators' creative pedagogies. The PSTs' *ahamkara* was built by the ITE educators through a series of activities that challenged the PSTs on their need to know about their natural environment (*macro-cosmos)* and their responsibility as a part of this environment. In the previous sub-sections, I described how the PSTs re-connected with their natural environment and addressed current environmental challenges through stimulation of *manah* and *buddhi*. The third dimension of the Balinese micro-cosmos, *ahamkara,* is a very complex concept and, as such, can only be signalled as a possible link in this study's activities. To demystify the possible results of *ahamkara* scaffolding in this short period of research, I now present relevant samples of articles written by the PSTs enrolled in an academic writing course, which was managed by Reka. These excerpts illustrate the PSTs' self-identification of their heightened eco-identity, or the ecological dimension of their *ahamkara*.

Reka incorporated creative pedagogy in four of fourteen course meetings, a culmination of the students' four years of environmental learning, as Reka articulated during our introductory workshop on creative pedagogy:

> Courses that I teach are connected from one to another, from the second to the eighth semester. In the second semester, pre-service teachers learn about research methodology, but aspects of research are not presented. We start with cases. We build cases then finalise our research outline. Pre-service teachers apply concepts of ecology in the field when they are in the fourth semester. They go to several locations to map biodiversity, such as floristic and avian diversity. By the sixth semester, we are going to have readily available data to be written into a paper. This paper is then refined in the eighth semester within academic writing course. Thus, in their final year, pre-service teachers are ready to submit their article. This article is also a draft of their thesis. That is how I structured my courses, spiralling up, spiralling up. We hope a good concept could be built. (Reka)

In his class, eight PSTs approached topics on environment learning in their articles, namely *subak* cultural landscape (SCL), sustainable development, sustainable education, and the recycling movement. They presented a glimpse into their teaching

practicum journey and their endeavours to incorporate environmental learning into their own classes, as represented by these five summaries:

> Rice-duck farming has been rarely integrated into our education system, including biology education, which is the central pillar of environmental learning. Rice field ecosystems should be taken as a form of environmental learning as we can study about rice-duck farming, a powerful system of our daily lives. There is a need to incorporate this topic into our local learning community through photos exhibition. This research aims to investigate how this learning community can reveal current perceptions, opinions, attitudes, motivations, knowledge, issues, and expectations regarding rice-duck farming in two areas of *subak* cultural landscape and an urban area. (Ana)

> I intend to apply the discovery learning model and photovoice to analyse its impact on in-class learning at a junior high school. Based on my observation, students in this school had a lack of environmental awareness. A lot of trash was dumped in the school's toilets and around classrooms. Discovery learning will be applied together with photovoice to resolve this issue. These learning models are implemented to develop students' learning. They are going to do a self-investigation presentation about environmental issues. It will be our discussion topics. (Helen)

> The concept of sustainable development has been explored extensively. However, not many examine environmental learning within a learning community, where local environmental context is positioned as its central learning theme. This research aims to describe an assessment of pre-service teachers' learning communities on the concept of sustainable development. This study might be essential to understand how pre-service teachers view the concept of sustainable development. By applying focus group discussion, information about wants, needs, perspectives, beliefs, and experiences of participants regarding the concept above will be uncovered. A photovoice approach will also be utilised to yield pre-service teachers' knowledge about sustainable development. (Sari)

> Sustainability of the *subak* system is formed by interaction among its economy, ecology, social, and cultural aspect. The ability to understand these four pillars is crucial, especially for higher education programs, which are expected to help to create a world of education that supports sustainable development. Research within this topic has not been much conducted in local contexts, although it is needed to inspire and prepare prospective teachers as facilitators of sustainable education. In this community-based participatory action research, I will investigate how jigsaw modification, photovoice, and discussion enrich pre-service teachers' knowledge about the four pillars. (Mahendra)

> This research aims at analysing the effect of project-based learning on students' scientific skills and creative process in a senior high school. In this learning model, students are asked to create products of the recycling movement. Trash is a never-ending problem. Indonesia has been nominated as the biggest producer

> of ocean waste plastic in South East Asia. We are the second biggest ocean waste plastic producer in the world with 3.2 million tonnes of trash polluting our ocean. Thus, a practical solution is needed. In response to the fact, environmental awareness should be nurtured early. A school subject which teaches about the environment is science, particularly biology. In this case, biology is not only about understanding facts, concepts, or principles but also discovery. Teachers are in the frontline of nurturing students' environmental awareness. (Bifi)

The ways in which Reka designed his courses reminded me of McGuire's (2015) hypothesis about solidifying ecologically responsible behaviour by adequately engaging self-identity, a psychological construct that affects cognitive automaticity and controlled processing, during environmental learning. The PSTs' articles demonstrate that their four-year journey of environmental learning experience has provided hope in enriching their understanding of local environment situations, boosting their human-nature reconnection, and facilitating the growth of their sense of identity. This finding mirrors purposes of environmental learning, as outlined by Ives et al. (2018), Klaniecki et al. (2018), Kollmuss and Agyeman (2002), and Orr (2004). Although clear implications of *ahamkara* stimulation cannot be drawn from this one research context, there is a positive note for engaging creative pedagogies with environmental learning to foreground Balinese Hindu indigenous concepts of co-rrespondence or self-identity with natural ecologies within this ITE program.

From the previous sub-sections, we notice how creative pedagogies transformed the content of experience in environmental learning. While Jarvis (2006) describes thinking, doing, and feeling as the three ways of learning that transform learning experience, my co-participants actively engaged *manah (*the processing mind), *buddhi* (the higher intelligence), and *ahamkara* (the sense of identity) to transform the PSTs' environmental learning experiences. In the next section of this findings chapter, I explore some of the complexities in implementing creative pedagogies for environmental learning.

Part C: Barriers and Strategies

Figure 42 – Ganesha (left) and Saraswati (right), two significant deities in Balinese Hinduism

Source: www.pinclipart.com and www.iconspng.com

Saraswati and Ganesha are some of the most significant deities in Balinese Hinduism (Figure 42), and both are icons of many schools and universities in Bali – places where they are worshipped daily. Ganesha represents knowledge, wisdom, and learning, and is depicted as an elephant-headed god with wide ears, small eyes, small mouth, a trunk, a single tusk, large stomach, and four arms. Ganesha's attributes are archetypes of the state of perfection: from kindness to power. His elephant head describes his intelligence and discriminative power and his four arms represent the balanced inner attributes of the body i.e., *manah, buddhi, ahamkara,* and *citta* (see Chapter 2 for further description) and express his pure consciousness: (1) the hand holding an axe symbolises protection of his devotee from obstacles, pain, and suffering; (2) the hand holding a rope and lotus indicates a tie that pulls his devotee to the highest purpose of life; (3) the hand with an open palm signifies a gesture of blessing; and (4) the hand holding *laddoos* (an Indian sweet) denotes that the sweetness of life needs to be appreciated and enjoyed.

During our final CCG meeting and after teaching had concluded, my co-participants reflected on their creative pedagogical practice and positions as teacher educators. One

of my co-participants stated that the role of being teacher educators should be reinterpreted in accordance with Ganesha's figure. He explained that an educator should transform their lecture-giving style into one that listens more and talks less, which is symbolised by Ganesha's wide ears and small mouth. He acknowledged that the framework of creative pedagogy contributed to this rethinking, especially as learning was located as a central focus for both teacher educators and pre-service teachers (PSTs). His assertion guided our reflective discussion on the importance of shifting lecture-style learning into a more collaborative learning, where meaning-making happens in both directions. It also uncovered the importance of professional learning and the continuous quality improvement focus of the ITE; to model quality teaching as well as developing tertiary education capabilities to keep pace with rapidly changing, and uncertain, times.

I explore barriers to creative pedagogies for environmental learning by drawing on the responses of my co-participants on uncertainties within their creative pedagogies, represented in their individual zoning of a pie chart (Figure 43). These responses are categorised into two major themes: managing pedagogical complexity and sustaining creative pedagogical practice.

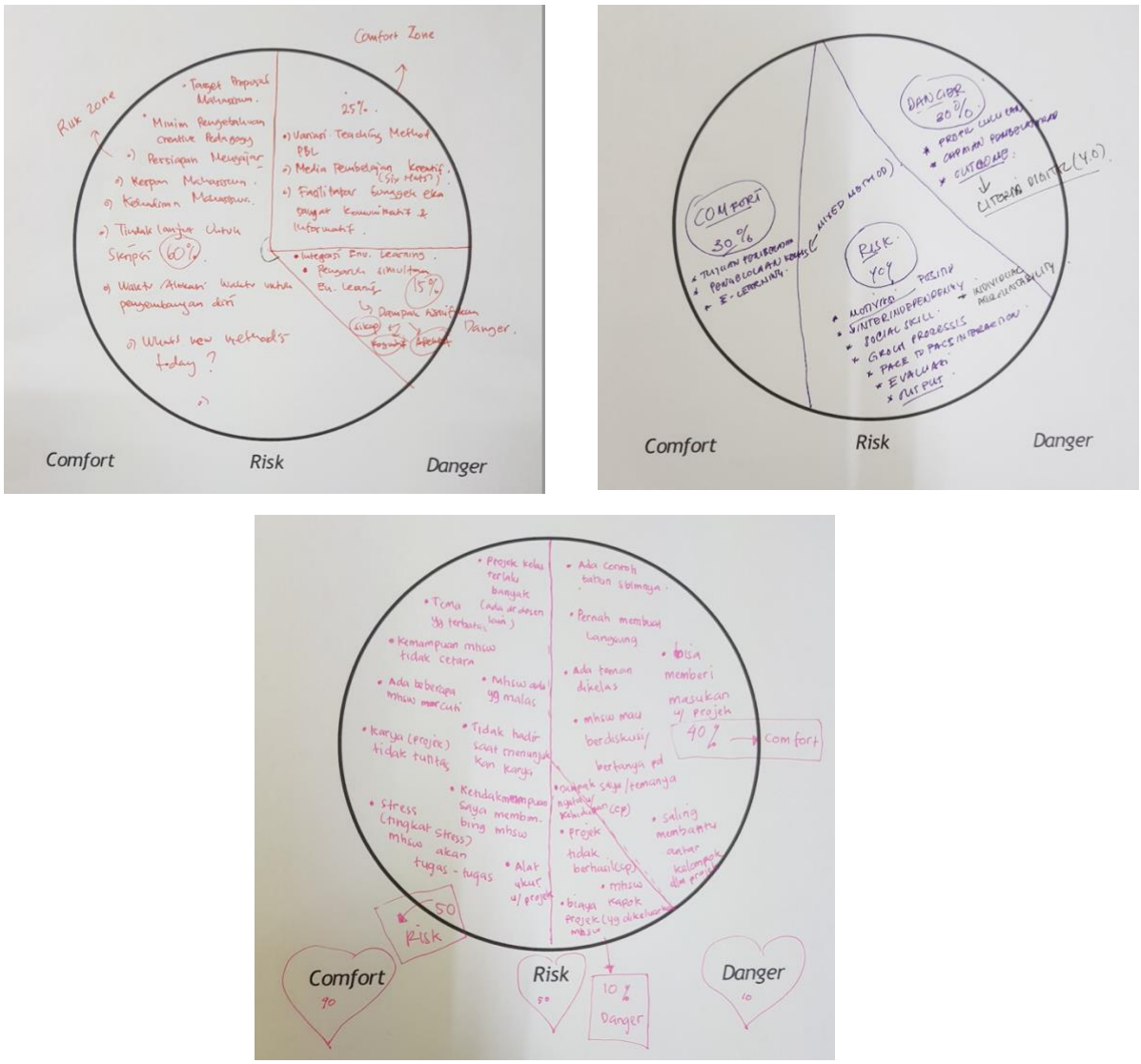


Figure 43 – A visual representation of zones of pie chart produced by the three ITE educators

Managing Pedagogical Complexities

My co-participants voiced four pedagogical complexities regarding PSTs' reception of their creative pedagogical practices.

First, Aya felt that environmental learning, as the focus of learning promoted in her pop-up book project, appeared to restrict the PSTs' creative ideas and became an additional pressure on the PSTs. 'The topic 'environment' has restricted the PSTs' creativity. Some PSTs came to me and said that it was limiting.' Aya applied a strategy that Stokes (2005) refers to as 'a task constraint', which creates a barrier to topics,

materials, and goals to stimulate responses that could lead to creative production. In Aya's situation, the use of a task constraint resulted in a sample of homogenous ideas, which is in contrast to Biskjaer et al.'s (2019) finding of heterogenous idea samples.

Second, Reka found that several PSTs articulated misconceptions about local environmental knowledge, which were challenging to attend to within the more self-directed activities of the creative pedagogy sessions. He felt it was likely a result of previous learning in primary or secondary school science education. Reka's concern supports Parker and Prabawa-Sear's (2020) findings on content and pedagogy barriers in the provision of environmental learning in the Indonesian formal schooling system. Reka further mentioned that the PSTs' inadequate skills, such as digital literacy, self-reliance, and social interaction, became another hurdle to navigate before the successful blending of approaches was achieved. Reka presumed it was due to a disparity in education quality across the class, as many of the PSTs who enrolled in his classes came from Indonesia's more disadvantaged rural and remote areas.

Creative pedagogies may be characterised as a dual pedagogy where both ITE educators and PSTs participate in risk-taking. The third concern of my co-participants' was related to pedagogical innovation generating risks to the PSTs' motivation and resources. This finding confirms Howard et al.'s (2018) assertion that struggle, discomfort, confusion, and uncertainty to proceed emerge during pedagogical experimentation.

> Creative learning in my class takes place in the form of creative project. Although I suggested my students upcycle, they still have to purchase other necessary materials. I hope the project did not financially burden them. (Aya)

> I observed that lately the students' motivation diminished. Low student attendance is worrying. I am not sure what caused that, but I hope it is not because of my pedagogical trial. Maybe I have to be more innovative. (Ryan)

I documented several responses from the PSTs that addressed this third pedagogical concern of my co-participants. One PST indicated that the change of pedagogies affected their learning quality:

> I think frequent changes of pedagogical practice confused us. Some of our learning problems have not been resolved by the lecturer yet we moved on to another topic with distinctive learning method. (Iluh)

Four PSTs expressed their discomfort with the group presentations that were a part of the learning activities they had to complete every week. These responses not only demonstrate the less promising outcomes of cooperative learning in higher education, they also challenge Loh and Teo's (2017) results on an increased security found by Asian students in the group learning environment:

> The class was too noisy because every group does presentation and discussion at the same time. (Ketut)
>
> My classmates are overly competitive. They debated me all the time. They do not want to listen and appreciate my opinion during our discussion. (Jegeg)
>
> My classmates did not listen to individual or group presentation. They are busy doing their own tasks. (Putu)
>
> Some members of my group are uncooperative and non-heterogenous. The learning activity was monotonous. (Jane)

Two PSTs confirmed the issue of low motivation and explained the causes:

> Sometimes I feel that I am not ready to attend the class because I did not prepare myself. Also, my classmates are unsupportive during the discussion period. They did not pay attention to individual or group presentation. (Supar)
>
> Abundant tasks but limited time. I am not ready to go to uni. (Tina)

In resolving the learning challenges mentioned by the PSTs', my co-participants identified a need to establish a space for collaboration, where PSTs can access assistance, provide help, deliver inputs, communicate their creative progress, and share hurdles in their creative learning. This collaborative space is in accordance with the concept of 'common representational space', which is characterised by Glăveanu (2011) as a place for a group's creative dynamic to manifest, different thinking styles to collide, and creative processes to spark. The sharing of resources within this space potentially facilitates creative fusion and enriches the personal representational space of each PST through the accommodation of idea divergences and tensions (Glăveanu, 2011).

While the greatest form of creativity is determined by the overall judgment of experts in their fields (Kaufman et al., 2008), comparative ratings of creativity seem challenging for classroom purposes. It was evident that assessment forms and summative outcomes of creative environmental learning was the last shared concern among my co-

participants. Although, from my observation, I noticed that my co-participants combined several different forms of assessment methods, such as self-assessment, peer-assessment, creative process assessment, and creative product assessment:

> I believe that assessment form and uncertain outcomes belong to the danger zone, while evaluation belongs to the risk zone. I am still figuring them out as this pedagogy is new to me. (Reka)

> I am constantly thinking about how I could measure the impact of environmental learning from three different perspectives, like cognitive, affective, and conative. That's why I put them in the danger zone as well. (Ryan)

> I agree with my colleagues. I put the impact of learning in the risk zone. I am wondering how the implementation of creative pedagogies can bring an actual impact to our lives. (Aya)

Sustaining Creative Pedagogical Practices

Sustaining creative pedagogical practices was the second major theme of uncertainty shared by my co-participants. Sustained creative pedagogical practice can be described as teacher educators' inventive, innovative, and interpretive capacity to plan, implement, and evaluate their teaching and learning (Kelly, 2017). My co-participants claimed that creative pedagogies and environmental learning were interesting and they anticipated attending professional development or training programs related to these fields. They acknowledged that, in the past few years, they had limited access to pedagogies-related refresher professional learning courses or seminars.

My co-participants also mentioned the poor availability of collegial support to help them expand and build on their knowledge and skills about pedagogical practice. They appreciated my role as a facilitator of Creative Collegial Group (CCG) meetings and included it in their comfort zones.

> My comfort zone consists of Mitha, as a researcher of this project, who is keen to provide support and input for my pedagogical practices. I am happy that you are here and observe my classroom. I don't feel that I am a single fighter anymore. (Aya)

> As a facilitator, you are very communicative and informative. I put those two elements in my comfort zone. I hope we can build a learning community like this in the future. I feel supported. (Ryan)

Engaging in a collegial conversation was a shared expectation among my co-participants. According to Rallis et al. (2006), a network between practitioners provides opportunities to inquire into real problems with peers, build capacity, and offer emotional and intellectual support to each other. This notion is linked to the concept of learning within a community of practice, as proposed by Wenger (1998). My co-participants viewed the Creative Collegial Group (CCG) meetings as a forum where their learning was situated and social. The implementation of a tuning protocol during our first CCG meeting, for instance, informed my co-participants that collegiality, conversation, and critical reflection were three inseparable and complex concepts, elaborated on by Selkrig and Keamy (2015). Furthermore, the shared expectation seemed to be demonstrating the need to maintain creative environments, which Kelly (2017) states 'require lots of stimuli and a culture where all ideas are validated and all involved are free to share ideas and to experiment' (p. 62). They expressed this idea as follows:

> I suggest holding collegial meetings like this on a frequent basis. I have got much input from Reka and Aya. It would be great if we could increase the length of discussion and reflection among us. (Ryan)

> I agree with Ryan as we have learnt much from each other during this collegial group meeting. I like the idea of using a tuning protocol to guide our discussion and reflection rather than implementing a free-form focus group discussion. Tuning protocol stimulated our participation, so we became more cooperative. I can feel the sense of learning community in this meeting. We should do this as a routine recharge. (Reka)

Uncertainties in the pedagogical complexity discussed during our introductory workshop were reconsidered by the ITE educators. For instance, my co-participants seem to be gesturing towards creating a pre-inventive structure to move their creative teaching forward. Kelly (2017) characterises a pre-inventive structure as a brief containing goals and parameters to enable adequate room for exploration and, if possible, a design of dialogic assessment that focuses on the PSTs' effort rather than the output. My co-participants mentioned the importance of maintaining PSTs' motivation through planning and implementing various teaching methods, using creative instructional media, and adjusting assessment. This realisation not only demonstrates a need for a pre-inventive structure, it also suggests my co-participants' efforts are directed towards sustaining creative practice for them and the PSTs.

I originally included a follow-up Skype interview with the ITE educator participants in 2020 to determine the long-term impact of incorporating creative pedagogies for environmental learning into their teaching. However, due to COVID-19 effects on both the health and work conditions, the follow up interviews had to be abandoned. This indicates that connected future research, once COVID-19 is no longer restricting the educators' availability, would be prudent.

Responses From the PSTs

At the end of my data collection phase, I collected responses of forty-six PSTs in an electronic questionnaire, designed to gauge their perceptions of creative pedagogies for environmental learning. Eighty per cent of the PSTs agreed that creative pedagogies were appropriate for engaging environmental learning, while the remainder went further and voted ‘strongly agree’. The PSTs mentioned perspective and attitude changes as benefits of the shifted pedagogical practice. They claimed these changes were important considering their future role as teachers:

> The creative pedagogy can assist students in transforming their perspectives about their local environment and their attitudes accordingly. (Roni)

> I shaped my perspective about *subak* through concept mapping. The lecturer also invited us to experience and observe what had actually happened in the field, for instance learning about pests by using a micro lens and portable microscope. (Ria)

> This engagement is beneficial for me because I am a teacher candidate who needs to know about environmental preservation. The idea of upcycling trash into a pop-up book helped me to realise the importance of our participation in 5R (reduce, reuse, recycle, recovery, and repair). (Made)

> We used significantly less paper in the classroom. (Gede)

Besides perspective and attitude changes, the PSTs further explained how creative pedagogies brought into practice the theories learnt in the classroom. Creative pedagogies not only offered a contextualisation of environmental learning, they also provided real experiences of concepts:

> The change of pedagogy fulfilled my needs on processing and experiencing local environmental learning. We utilised our attitude, skills, and understanding

> towards three important aspects of life, namely function of ecosystem, local culture, and application of modern technology creatively and critically. (Susi)
>
> My lecturer prepared us with skills that are needed to resolve environmental issues around us. I learnt some practical ways to preserve the environment through creative pedagogy as well. (Nola)
>
> The topics presented were strongly connected with real problems. The lecturer encouraged us to participate in learning in which memorisation of theories is not needed at all. It has broadened our perspectives. (Nia)

Eighty-one per cent of the PSTs claimed that they liked the incorporation of creative pedagogies and environmental learning in the courses they enrolled in, while seventeen per cent stated that they loved the implementation, and two per cent chose neutral. The PSTs highlighted elements they liked from the shifting of lecturers' pedagogies:

> The in-class learning was interactive and fun! (Murni)
>
> I like the change because it made classes more interesting and relaxed. (Putu)
>
> I am happy studying with my lecturers who implemented creative pedagogies because they had ways to make use more relaxed when learning. Thus, I learnt at maximum capacity. (Suma)
>
> My lecturer has inspired me to be a great educator! (Ida)
>
> We learnt that, as prospective teachers, we need to understand reflective practice. In this class, we evaluated our own learning every week. We are responsible for our own learning. (Ana)
>
> I feel a different element of learning in his class. The students engaged with peers, performed active learning, and evaluated their learning. (Kadek)
>
> I like it when we resolved problems together. (Mina)
>
> Problem solving is less boring in his class. The way he presented the materials has increased my interest in environmental education. (Ketut)
>
> He explained the topics very well. I understand better. (Lita)
>
> The use of sticky notes was amazing. It encouraged the students to be resilient and persistent in learning a particular subject. (Agus)
>
> Everyone participated in the learning. Everyone has a specific responsibility as an individual and as a group member. (Ria)

From the vantage point of pre-service teachers (PSTs), the enactment of creative pedagogies for environmental learning by their lecturers successfully transformed their learning. They also identified that added enhancements could be implemented through digital platforms for quizzes, reflection, games, and logbooks for a more engaging learning experience. Most of the PSTs viewed online learning as a space for exploration and discovery, while Rust (2017) suggests that the younger generation prefers new media tools as they offer quiet, efficient, and fast ways to deliver ideas. The PSTs' input suggests the need for conducting further investigation into administering creative pedagogies in digital online spaces. The need is exacerbated by the recent COVID-19 related teaching and learning shifts to an online environment, which, according to Henriksen et al. (2020), requires multiple role adaptations of ITE educators, for example, as content creators, editors, and instructors, amidst sudden transition.

The PSTs also suggested a reduction in the number of individual tasks and an increase in the length of time spent on collaborative reflection with the ITE educators. Although my co-participants organised a specific amount of time for peer reflection among PSTs and a space on Google Class, which might translate to collaborative reflection (Krutka et al., 2014), the PSTs' preference for more time reflecting with their ITE lecturers confirms Clarà et al.'s (2019) assertion that learning to reflect in teacher education requires active assistance from the ITE educators. Collaborative reflection can be promoted by ITE educators through providing arguments for, or against, a problem, demonstrating possible courses of action to resolve a situation, offering ways of understanding a situation, and making value judgments about a situation (Clarà et al., 2019).

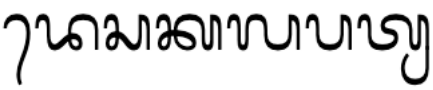
Chapter Summary

In this finding chapter, just as my methodology followed connected elements of research activities, my findings are discrete parts presented here in connected sub-chapter sections; commencing with specifically examining my tertiary educator co-participants' initial views and experiences of enacting creative pedagogies and environmental learning, which have been predominantly shaped by Western perspectives. I further identify that my co-participants had the intention to ground their

teaching about environmental learning in the Balinese traditional philosophy through creative pedagogies. My findings from the CPAR activities, designed to explore how creative pedagogies can support transformative environmental learning in an Indonesian teacher education program, extend Lin's (2011, 2012) creative pedagogy model to understand the enactment of creative pedagogies in Asian classrooms. Illustrated as a mandala, I present a framework for creative pedagogies within a local traditional knowledge context, where the interconnections between features of creative pedagogy (creative teaching, teaching for creativity, and creative learning) are evident, and the nuanced features of these teaching and learning activities are made visible. For the purposes of unpacking different approaches, key strategies (mandala features) are considered separately in this chapter to spotlight aspects of creative pedagogies for environmental learning. The different features identified incorporate many areas of teacher work, such as structural arrangements of timetables and classes, teaching approaches, professional learning when trying out new ideas, and initiatives in connecting students with their local place. It was evident that my co-participants prepared learning journeys for their PSTs consistent with developing Balinese qualities of the processing mind (*manah*), higher intelligence (*buddhi*), and sense of identity (*ahamkara*). There was little doubt that my co-participants could bring transformative environmental learning into practice for their students. In addition, I identified that my co-participants went through perspective transformations themselves and responded to the aim of this research by administering what the participant ITE educators termed 'accommodative environmental learning' – first-order learning to understand, adapt, and maintain sustainability of the environment. In this chapter, I explored the conflicts, concerns, and shortcomings of creative pedagogies, which were contextualised in teaching environmental learning to foreground indigenous ways of knowing. The perspectives from both ITE educators and PSTs in this research could help us proceed further in understanding the challenges, as well as the potential solutions to resolve the barriers, in adopting creative pedagogies in the tertiary classroom.

CHAPTER 5: SYNTHESIS AND CONCLUSION

Metaphorical Concepts that Guide this Chapter



Desa, Kala, Patra

Place, time, and circumstance

In Chapter 1, I introduced a Balinese saying – *nak mula keto* – that is often used to express the need to accept traditions or rituals as they are. For Balinese people, the practice of acceptance means recognising elements of life that they cannot control, including factors of *desa* (place)*, kala* (time)*,* and *patra* (circumstance). While the idiom of 'it depends' signifies uncertain situations to a Western society, the Balinese people see the phrase 'it depends' as regarding a specific place, time, and circumstance. For example, if one asks, 'what does a *canang* (offering) look like?', my answer would be 'it depends on the *desa, kala, patra.*' The shape of *canang* is determined by three conditions: where it is created, when it is going to be offered, and what the purpose of the offering will be. *Desa, kala, patra,* as a life philosophy, relates to the importance of developing awareness towards our surroundings. It encapsulates the flexibility and adaptability of Balinese society. It also suggests the importance of maintaining our roots, while being dynamic and progressive – traits required to survive the modern world. In this concluding chapter, *desa, kala, patra* informs me that, although generated from an inquiry situated in the context of environmental learning for an ITE program, the main findings of this research (the mandala of creative pedagogies) holds possibilities of being applied, adapted, enhanced, and evaluated in another place, time, and circumstance. Another highlight is that this inquiry provided a third space (Lin, 2014; Tasler & Dale, 2021) for a small group of ITE educators to weave their past experiences of including creativity and environmental education in their teaching together with their indigenous knowledge to re-interpret their present pedagogical practices and to predict on their future classrooms.

My intention with this study was to explore the practice of creative pedagogies by a small group of educators in the setting of an Indonesian initial teacher education (ITE) program, for the purpose of facilitating environmental learning. This study aligns with Barnett's (2018) imperative to shift the dominant focus of the higher education landscape from the economic realm to other life ecosystems, such as personal, social, and planetary wellbeing. The research question, and the three sub-research questions, developed to undertake this inquiry were:

Primary research question:

1) How do creative pedagogies support the establishment of transformative environmental learning in an Indonesian teacher education program?

Sub-questions:

1) In what ways do creative pedagogies develop teacher educators' capacities to scaffold environmental learning in an Indonesian teacher education program?
2) What are the barriers and strategies to building effective creative pedagogies for environmental learning in an Indonesian teacher education program?
3) How do creative pedagogies bring indigenous knowledge and practice to the foreground of environmental learning in an Indonesian teacher education program?

In this concluding chapter, I will outline the principle messages derived from this study, which was underpinned by major concepts from Barnett's (2018) ecological university, Sterling's (2001) environmental learning, and Lin's (2011) creative pedagogy framework. Findings of this inquiry are embryonic examples of ways lecturers can tease out notions of creativity, indigenous knowledge, and environmental learning, to reorient their pedagogies, transform science education, and contribute to connecting zones of the world within the ecosystem of the university they work in. I will outline the key findings in response to each of my research questions, discuss the implications of this research, suggest future directions for expanding on this research, and provide a final reflection on this research in the remainder of this chapter.

Responses to Each of the Research Questions

While the three ITE educators who participated in this inquiry worked at a Western-style university, they sought to bring their indigenous perspectives into their courses. In this instance, my co-participants adjusted the Western creative pedagogies framework and environmental learning to their own *desa, kala, patra*. As explored in Chapter 4, my co-participants' creative pedagogies were, in part, designed to assist PSTs to interact with traditional elders in yielding Balinese knowledge and practice on a cultural heritage site called *subak*. This process of generating knowledge resonates with Manathunga's (2014) belief that 'knowledge travels from place to place, taking on particular hues and meanings that are inflected by local places and cultures' (p. 40).

Unpacking the Mandala of Creative Pedagogies for Environmental Learning

In this section, I will provide responses to the primary research question (*How do creative pedagogies support the establishment of transformative environmental learning in an Indonesian teacher education program?*). I captured the interaction between my co-participants' creative pedagogies and environmental learning within their local contexts in the design of a mandala of creative pedagogies, which enhances and substantially builds on Lin's (2011) interconnected elements (creative teaching, teaching for creativity, and creative learning) within a creative pedagogy with detailed creative features. In my mandala framework, although illustrated as separate puzzle pieces, many of the features (pieces in the mandala design) happened simultaneously – each feature integrated and sequenced with the other features. As my co-participants were the first known to have explored teaching and learning through the intersections of creativity, environmental learning, and indigenous knowledge, this research generates a framework of new pedagogical practices that offer opportunities for change in relation to the establishment of an ecological university.

The research co-participants' creative teaching approaches resonated with those that Mullet et al. (2016) described, involving personal creativity, creative processes, and initiatives in creating an enjoyable learning ecosystem to nurture the PSTs' creativity. Three key features of the advanced mandala framework of creative pedagogies for environmental learning (designing and evaluating divergent thinking exercises; trying new teaching ideas; and performing risk-taking actions) that emerged in relation to

creative teaching contributed to the strengthening of many of the university ecological zones identified by Barnett (2018), namely learning, culture, natural environment, persons, and knowledge ecosystems. Similarly, the mandala puzzle piece for designing and evaluating divergent thinking exercises, which was supported by two other features (delivering motivation and tolerating ambiguity), built upon three characteristics of a learning ecosystem, namely interdependence, feedback loops, and cooperation. This mandala feature demonstrated that knowledge construction within environmental learning happened beyond the four walls of a classroom. While the PSTs were invited to discuss Balinese indigenous ways of knowing through divergent thinking group exercises, they also experienced how their knowledge expanded as they built connections with farmers in *subak* sites. Thus, this research shows creative teaching opened a third space for interconnecting the learners, knowledge, community, and natural environment.

Teaching for creativity aimed to develop a range of skills in the PSTs, from content knowledge to life skills, including a resilience that is constructed through confidence, persistence, and curiosity (Harris, 2017; Harris, 2016; Lucas, 2016). Nine features of teaching for creativity emerged to support the PSTs in the process of being, and becoming, a prospective teacher. These nine features are illustrated in the mandala framework. Three of the key features (stimulating risk-taking/mistake-making, exploring curiosity, and building autonomy of the PSTs) generated an interplay between Barnett's (2018) ecology of person and learning. In this instance, the co-participants' teaching for creativity facilitated the development of the PSTs' wellbeing, capacity, agency in learning, and academic identity as future teachers. Meanwhile, the ecology of learning was expanded through collaboration and critical dialogue.

Creative learning encompassed meaningful self-initiated learning through various sources and perspectives, reflective actions, and correspondence. While a variety of strategies were implemented by my co-participants to support autonomous learning within their classes, the PSTs were assisted to commit to being knowers, and reflective practitioners (Brockbank & McGill, 2007), of their learning outside of the classroom. A space called 'co-rrespondence' (Sterling, 2009) emerged, which I interpreted as an effort to (re-)connect with the wisdom of people and lands through experience, respect,

expressions of empathy, and compassion. Co-rrespondence provided opportunities to strengthen the PSTs' identities and build their capacities for understanding a complex view of nature from Balinese ways of knowing through community engagement within their cultural heritage: the *subak*. This initiative challenged Stables' (2009) proposition that creativity and environmental learning are 'silent partners' in the higher educational setting. It became apparent that creative pedagogies advanced environmental learning in this study's context of a Western-style university in an Asian setting. By connecting with indigenous knowledge and ways, Lin's (2011) three elements of creative pedagogies were clearly augmented, as represented by my design of the mandala of creative pedagogies for environmental learning. This mandala functions as both a representation of findings and a framework for practice.

Exploring the Teacher Educators' Capacities for Scaffolding Environmental Learning Through Creative Pedagogies

In this section, I will provide responses to the first sub-question (*In what ways do creative pedagogies develop teacher educators' capacity to scaffold environmental learning in an Indonesian teacher education program?).* The ITE educators in this research project had previously taught environmental learning, although they were not familiar with the notion of creative pedagogies. It became apparent that my co-participants had different understanding of creativity. While varied, in many ways their understandings echoed creativity as involving productive skills, innovative flexibility, and inventive ingenuity, which resonated with Taylor and Gantz's (1969) conceptualisation of creative skills. Our conversations about creativity, which included my co-participants' drawing on their previous experiences of incorporating creativity into their classes, became an opportunity to reconceptualise creative pedagogy. We conceptualised creative pedagogy as a dynamic interaction of creative teaching and learning between ITE educators and PSTs, comprising interaction with various socio-ecological components. This emerged as a discussion starter to my co-participants' endeavours in relation to education for sustainable development (ESD), which were guided by Western scholars such as Orr's (2013) concept of place-based education. It was evident that the co-participants had different understandings and experiences of creativity and sustainability in their teaching, but they all felt it was important to

reconnect their pedagogical practices with their native biodiversity, including their Balinese worldview.

It became apparent that my co-participants were not confident in aiming for transformative environmental learning due to a lack of professional development opportunities that encompassed this topic. Hence, they chose to establish accommodative environmental learning (Rickinson et al., 2009) by gauging PSTs' interest, which Csikszentmihalyi and Wolfe's (2014) believe can encourage ownership of learning. It was evident that inquiry-based learning was a key strategy used by the co-participants to promote accommodative environmental learning. This key strategy reflected the development of a holistic relationship between place, eco-science, and social arrangement within a shared instrumental Balinese knowledge and practice called *subak*, as indicated by Luke (2001). These multiple contexts of learning are a demonstration of what Sternberg (2019) terms cross-fertilisation, which potentially develops students' creative insights. This research demonstrated that creative pedagogies offered a third space where Balinese ways of knowing and Western ways of thinking interacted to promote changes for both ITE educators and PSTs' environmental learning.

Foregrounding Indigenous Knowledge and Practice Through Creative Pedagogies

In this section, I will provide responses to the third sub-question (*How do creative pedagogies bring indigenous knowledge and practice to the foreground of environmental learning in an Indonesian teacher education program?).* In relation to co-rrespondence (a closer knowledge match with the real world), a key approach taken by my co-participants to establish accommodative environmental learning was a reconnection with their localities. I found that a Balinese concept of cosmology was encapsulated within this approach. My co-participants aimed at sharpening the PSTs' minds, naturally following the Balinese philosophy of a lifelong process of evolvement and learning: *manah* (a processing mind), *buddhi* (a higher intelligence), and *ahamkara* (a sense of identity). The ITE educators stimulated *manah* within their classes by combining games, local socio-scientific environmental issues, and inquiry-oriented activities within a Science, Technology, Society, and Environment (STSE) education framework, indicating what Gresch et al. (2017) characterises as a strategy to accelerate

critical decision-making for the PSTs. The implementation of STSE changed the nature of my co-participants' classrooms, where knowledge transmission became knowledge construction, which is described by Aikenhead (1992) as a transformation. This approach was followed by reflective thinking, which aligns with Renee et al.'s (2020) suggestion that including reflection will grow a deeper understanding of issues around our environment.

Appreciation for, and comprehensive knowledge about, the natural environment (Capra, 2007) were two foci of higher intelligence (*buddhi*) development. Utilising multiple perspectives (e.g., social, cultural, ecological, and economic) while re-connecting with places offered opportunities to explore ecosystem interconnectedness that harnessed the PSTs' *buddhi*. According to Orr (2013), engagement with meaningful places in the community goes beyond intellectual comprehension. It was evident that place-based learning organised by my co-participants had increased the PSTs' reflective and empathetic qualities, resonating with Goralnik and Nelson's (2017) proposition to involve intimate views of nature into classrooms. Some responses from the PSTs after *buddhi* stimulation exemplified that the meaning-making of a local environment could be accompanied by pro-environmental actions when personal purpose, thoughts, and feelings of the PSTs are shared, things that Dewey (2010) argues may lead to like-mindedness or common understanding within a learning community. Explicit initiatives of pro-environmental actions were noted during teaching. It highlights Shephard's (2008) assertions that environmentally friendly actions are rarely demonstrated, even often avoided, by educators in higher education.

While it was challenging to evaluate how the PSTs' sense of identity (*ahamkara*) impacted their ecological perspectives and actions, my research uncovered their growing environmental awareness through academic writing. One way to ensure the development of *ahamkara* is by consistently incorporating environmental learning into the courses we teach. One of my co-participants was an ideal example of a dedicated ITE educator who designed a sequential environmental learning for the PSTs, beginning in their first year. From the PSTs' assessment essay drafts it was evident that environmental learning was a fulfilling experience, which has enhanced their

understanding of their local natural environment, assisted their human–nature reconnection, and helped nurture their sense of identity. This finding resonates with aims of enacting environmental learning as highlighted by Ives et al. (2018), Klaniecki et al. (2018), Kollmuss and Agyeman (2002), and Orr (2004). It became apparent that creative pedagogies enabled a bringing of indigenous knowledges and practices to the foreground in the co-participants' teaching of environmental learning. Creative pedagogies also promoted transformative learning in both ITE educators and PSTs, as evidenced by the changes in the educators' practices and design of learning content. From the PSTs' viewpoints, creative pedagogies not only stimulated active learning, they also accommodated perspective and attitude changes towards their local environment.

Inquiring Barriers and Strategies in Relation to Creative Pedagogies

In this section, I will provide responses to the second sub-question (*What are barriers and strategies to building effective creative pedagogies for environmental learning in an Indonesian teacher education program ?).* There was four pedagogical complexities to implementing creative pedagogies for scaffolding environmental learning revealed by the ITE educators in this study. These complexities would need to be addressed for future enactment of creative pedagogies for environmental learning. First, the theme of 'environmental degradation' seemed to generate homogenous ideas in students' creative projects, which is in contrast to Biskjaer et al.'s (2019) findings about heterogeneous ideas promoted by task constraints. Second, misconceptions in knowledge about the environment were likely a product of education disparity in Indonesia, supporting Parker and Prabawa-Sear's (2020) findings about content and pedagogy barriers for environmental learning in the Indonesian educational system. Third, there was a concern that risk-taking by the ITE educators when changing their pedagogies had affected the PSTs' motivation. Four, my co-participants acknowledged the need for exploring assessment methods for measuring outcomes of creative pedagogies. Finding strategies to address these concerns will be valuable professional learning for the educators in the future, and for new areas of research.

PSTs' voices also indicated there were challenges in learning due to the pedagogical change by their lecturers. First, the different pedagogies made their learning more

complicated because their position shifted from dependent to self-directed learners. Second, the weekly group presentation triggered workload issues among the PSTs, such as some becoming freeloaders and others excessively competitive. Third, various tasks simultaneously given by the three lecturers lowered the PSTs' learning motivation because of a perception of having limited time. From the ITE educators' perspectives, those barriers could be resolved by establishing a safe space for the PSTs where they could share their learning journey, which Glăveanu (2011) refers to as 'common representational space.'

The ITE educators in this study clearly identified that creative pedagogies have supported the incorporation of environmental learning into their courses, however there was an uncertainty about the sustainability of their practices. My co-participants agreed that the opportunities for professional development through activities (e.g., seminars, workshops, and conferences), to expand their perspectives on creative pedagogies and environmental learning, were limited due to these fields' emergent nature in the Indonesian setting. Another factor mentioned by my co-participants was the unavailability of a collegial forum that focused on the development of those two fields.

Implications of the Research

This research adds an important further discussion to the existing body of work on creative pedagogies and environmental learning and extends this into an intermeshing of East and West meaning-making in the context of adult learning. I have shown here that the interaction between creative pedagogies and environmental learning, within the little understood field of teacher training and in an Asian context on the small island of Bali, suggests the possibility of assembling Barnett's (2018) notion of the ecological university. This research also contributes ITE educators and PSTs' perspectives on prioritising their creativity, environmental self-identities (McGuire, 2015), community, and indigenous ways of knowing. The findings uncover the ITE educators' endeavours to build innovative pedagogical practice, connecting lifeworlds of indigenous Balinese ways of knowing with Western tertiary education approaches. Within this critical participatory action research (CPAR), the ITE educators practised five stages of creative process (Sadler-Smith, 2015) as they redefined creativity from Big-C to everyday

creativity. Many of the PSTs stated their positive experiences during the enactment of the ITE educators' creative pedagogies for environmental learning, signalling the compelling potential of these pedagogical strategies.

Building on Lin's (2011) creative pedagogy framework (creative teaching, teaching for creativity, and creative learning), the mandala of creative pedagogies for environmental learning developed in this study offers a teaching and learning tool for re-envisioning creative classrooms in the future. The mandala puzzle pieces demonstrate that positive creativity (Kaufman et al., 2019) can be stimulated through learning activities that focus on developing both students' emotional intelligence and intuitive forms of thinking. The mandala also encompasses explicit approaches for teachers to practise their creativity. For teachers who value creativity from its socio-cultural dimension, this mandala provides practical strategies to (re-)interpret indigenous knowledge as well as practice.

This thesis is a model for future researchers who aim to work in an intercultural domain. I demonstrated ways to weave both Balinese and Western knowledge together in this CPAR, for example by narrating metaphors I live with in the beginning of each chapter to guide the focus for the chapter topic. This Western-style thesis recognises a significant number of Balinese indigenous knowledges, cultures, belief systems, and traditions. It responds to Manathunga's (2014) notion of assimilation during a doctoral study, in which my development as a researcher did not happen as merely a one-way process of my socialisation into Western knowledge. Hence, this research generates a unique blending of Western and Balinese indigenous knowledge that demonstrates my original contribution to the discipline.

Future Directions

This research has shown that there is a need for a continued reimagining of the impact of positive creativity on other aspects of tertiary education in future research. This thesis is a discussion starter on the exploration of creative pedagogies for environmental learning in the context of Initial Teacher Education (ITE) programs. Further research is needed to interrogate how the mandala of creative pedagogies for environmental learning can be used in other educational settings or within other disciplines of knowledge. Although I have discussed the barriers and strategies, further investigation

would be necessary to turn these barriers into opportunities for consolidating the practices of creative pedagogies for environmental learning that enable a third space for conservation. Future research could be navigated to uncover the participant pre-service teachers' creative pedagogical practices applied during their micro-teaching courses or in-school placements, particularly when considering their significant role of continuing the teaching of environmental learning in their future work as teachers.

Another area for further investigation is the possibility of extending the concept of 'co-rrespondence' to encompass other indigenous ways of knowing and practice in approaching an environmental learning that promotes sustainable lifestyles. A future study would assist in building an understanding of how indigenous knowledge and practices are promising learning sources that support transformative environmental learning in the twenty-first century. This would involve approaches to permeate more of Barnett's (2018) ecological zones into higher education, ensuring universities contributed beyond their dominant focus on the economic domain. In the end, this research reveals many possibilities for future research and applications in other contexts.

Final Reflection

As a starting point for this inquiry, I described an indigenous wisdom – *nak mula keto* (it was ever thus) – that served as a critical thinking tool for a Balinese like me to undertake this research differently. Along the journey of this inquiry, I have been continually practising *mulat sarira* (the courage to self-reflect). The *mulat sarira* process of my thesis writing happened as I inquired amidst the uncertainties of undertaking independent research; of COVID-19 times; and of working in a cross-cultural space. I applied creative analytic practices through Balinese metaphors I live by and I enhanced my interpretive skills by reconnecting my micro-cosmos with the larger ecosystems guided by relevant literature from Western perspectives and Balinese indigenous knowledge and practices. This philosophy of *mulat sarira* helped me to navigate changes and embrace possibilities within this research. In bringing this study to an end, I reflect on both the co-participants' experiences and my own story conducting this research.

I saw an enthusiasm in the ITE educators who participated in this research when I first mentioned the phrase ‘creative pedagogies for environmental learning’ – clearly an uncharted territory they could not wait to explore. As my co-participants and I collaborated to enlighten ourselves about the creative pedagogy framework, they pondered how assessment might be undertaken. This concern displays an impeding factor of creativity in higher education, which Jackson (2006) argues is situated in outcome-based assessment tasks and criteria. We should not be surprised as assessment is an inherent and long-accepted part of learning in a formal education landscape, just as we accept the Balinese saying of *nak mula keto*.

For my co-participants, their involvement in this research was not only a creative learning action, it was also a risk-taking movement. Similar to the cyclic practising of Balinese rituals, the cycles of practice reflection the teacher educators participated in during this research promoted transformation within their ITE program teaching and learning in a creative environment of excitement and challenge. The ITE educators have demonstrated courage to manage pedagogies of uncertainties. They have explored new teaching and learning strategies. They have readjusted their assessment methods. They have welcomed warm and cool feedback from their colleagues. Finally, they have transformed their teaching of environmental learning practices within their units of teaching.

For me, this research has generated a third space for my own growth as an intercultural researcher studying in an Australian university. I have experienced creative pedagogies myself through the three phases of this CPAR. I have experimented with teaching for creativity and creative teaching during the introductory workshop. I have deliberately engaged creative learning during the period of this study. However, I did not predict that the interaction between creative pedagogies and environmental learning could open a third space for reconnecting with my own Balinese indigenous ways of knowing and practices.

Findings of this inquiry demonstrate how creative pedagogies have offered a generative third space for both ITE educators and PSTs to overcome binaries between East and West ways of understanding environmental learning. My co-participant tertiary

educators, PST students, and I worked in the borderline between our traditional knowledge and knowledge resulting from a modern education, creating a different fusion of knowledge, function, and being with others. Instead of contesting Western environmental learning, we immersed ourselves in generative knowledge to reorder pedagogical practice by interrelating the two distinctive spaces (Western and indigenous knowledge) to approach environmental learning from a fresh standpoint.

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Appendices

Appendix 1 – Observation checklist

OBSERVATION CHECKLIST

Name of ITE educator: _____
Time : _____
Course Name : _____
Number of PSTs : _____
Semester : _____

No.	Aspects of Creative Pedagogies to be observed	✓	Example	Notes
1.	**Creative Teaching:** There are segments of teaching from ITE educators where: - problems or cases are posed - divergent thinking exercises are presented (e.g., brainstorming) - divergent ideas are evaluated - output of collaborative work is valued - motivation is delivered - new idea(s) of teaching is implemented - risk-taking is performed - synthesis from PSTs is evaluated - ambiguity happened is tolerated in the class - assessment structure is re-balanced to measure process rather than product - assessment structure is designed against text-like activities - timetable changes are done to enhance opportunities for collective creativity - space for communication is provided to share creative ideas - class layout works for collaborative work for PSTs Environmental learning is presented in any of these three interrelated areas: - Affective dimension - Cognitive dimension - Intentional dimension Environmental learning is presented to encourage any of these three movements: - Respons-ibility (sense of concern) - Co-rrespondence (knowledge match with real world) - Respons-ability (ability to take integrative & wise action in context)			

2.	**Teaching for Creativity:** There are segments/learning activities where: - curiosity of PSTs is stimulated or rewarded or explored - PSTs are encouraged to collaborate or perform a teamwork - require PSTs to do problem-solving - confidence of PSTs is built - persistence of PSTs is built - innovation or new ideas are encouraged - risk-taking and mistake-making are not penalized, even encouraged - PSTs are asked to synthesize - critical thinking is encouraged - creativity is demonstrated in class or outside of class time - PSTs are given autonomy in accomplishing creative tasks Environmental learning is presented in any of these three interrelated areas: - Affective dimension - Cognitive dimension - Intentional dimension Environmental learning is presented to encourage any of these three movements: - Respons-ibility (sense of concern) - Co-rrespondence (knowledge match with real world) - Respons-ability (ability to take integrative & wise action in context)			
3.	**Creative Learning of ITE educators is observed from:** - Sequence of activities in and outside of the class which arrive from a variety of sources - Sequence of activities in and outside of the class which arrive from a variety of perspectives - Any reflective action shown in the class (e.g., for previous meeting)			
4.	**Creative Learning of PSTs where:** - Their learning is meaningful to their immediate needs and interests [relevance] - They learn for themselves [ownership of knowledge] - They are self-motivated [control of learning-processes] - Something new is created by them [innovation]			

Adapted from Harris (2017), Harris (2016), Jeffrey (2006), Rickinson et al. (2009)

Appendix 2 – Online survey questionnaire for PSTs

Questionnaire for the Research Project:
Engaging Creative Pedagogies to Reframe Environmental Learning in an Indonesian Teacher Education Program

About the Research
In responding to critical time ecologically, Initial Teacher Education (ITE) Educators and pre-service teachers in the Biology Department have an important role in our society to cultivate future generations' ecological consciousness. This research project assist your ITE educators to facilitate classroom discussion about environmental issues by implementing creative pedagogies. We are looking to describe your perspectives on your experiences about creative pedagogies practice. The following questionnaire includes a mixture of questions and statements, where we ask you to respond either by ticking a specific box, or writing short responses. **Please note** there are no right or wrong answers.

Once you have completed this questionnaire, insert the document into the attached envelope and then deposit it into the secure drop box at UNMAS Kampus Soka located in the lecturer's office.

1. Please respond to the following statements

1.1 Environmental learning is an integral aspect of Biology Education
(tick one of the descriptors below that best represents your view about this statement)

I Don't Know	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

Feel free to provide any comments about your response to this statement

1.2 Creative pedagogies implemented by my lecturer(s) is suitable for environmental learning (tick one of the descriptors below that best represents your view about this statement)

I Don't Know	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

Feel free to provide any comments about your response to this statement

1.3 I like the lessons presented by my lecturer(s) where creative pedagogies were implemented (tick one of the descriptors below that best represents your view about this statement)

I Don't Know	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Feel free to provide any comments about your response to this question					

2. Please provide responses to the following statements
a. What I do not like from the lessons presented by my lecturer(s) are:
b. Changing elements that I notice from our lessons are:
c. To improve the lessons, I would suggest:
d. In my opinion, something which we could do differently with the lessons are:

THANK YOU FOR YOUR PARTICIPATION ☺

Appendix 3 – Conceptually clustered matrix

HOW DO ITE EDUCATORS USE CREATIVE PEDAGOGIES TO SUPPORT THE ESTABLISHMENT OF TRANSFORMATIVE ENVIRONMENTAL LEARNING IN AN INDONESIAN ITE PROGRAM?

		KS			AA	EY
		General Ecology (Semester 4)	**Contextual Biology Learning (SEMESTER 6)**	**Writing Academic Articles (SEMESTER 8)**	**Research Methods (SEMESTER 6)**	**Entrepreneurship (SEMESTER 6)**
CREATIVE TEACHING	**Posing problems/cases**	1. How to do field survey in 3 different sites 2. What to prepare 3. What to draw after observation	1. Presenting statistical analysis of photovoice from 3 different lenses (socio-cultural, economy, & ecology)	1. How to compose, present, and evaluate a concept map of your academic article 2. How to write references in APA style	1. Cases about different research methods were presented in forms of illustration 2. Various research methods (*What is it? When to use? What's the advantage? What could be the challenge?* 3. Using analogy of cutting trees in the wood & catching dragonfly to explain tools of analysis	1. Kinds of entrepreneurship can be done by PSTs
	Presenting and evaluating divergent thinking exercises	Brainstorming	Logbook, brainwrite, *bermain dadu*	Brainstorming	Brainstorming, create driving questions	PechaKucha presentation, short essay, brainstorming
	Delivering motivation	✓	'Please share your opinion, don't be afraid'; KS also focused giving his motivation to 2 PSTs	'I am happy to see a lot of red sticky notes here. I am aware that those students who were usually very quiet are now brave to speak up, even rebut their friends'	'You don't need to find the answer on Google. Your own opinion is valued'; every PST were given a high five	'We do not demand perfect products from you. What is more important is the process you will go through'
	Valuing collaborative works of PSTs	Synthesis yielded from *bermain dadu* were evaluated and given feedbacks	After group discussion, each group presented their report. KS always gave feedbacks and evaluation	'I do really appreciate your effort. You guys are very proactive in learning'	After presentation, feedback was given to each group	'I can see how this week, page 1 and 2 are so much better than what we had a couple of weeks ago'
	Implementing new idea of teaching	Brainwrite, games (*bermain dadu*)	Brainwrite, games (*bermain dadu*)	Concept map presentations in an exhibition-like venue, brainwrite, science art	Certainty of Response Index (Confident, Hesitate, Not Confident), six thinking hats, venn diagram drawing,	Pechakucha

					role play, analogy/imaginary case & recording and replaying own presentation (*SPSS tutorial*)	
	Performing risk-taking actions	Invite all PSTs to three different sites e.g. *subak*, mangrove, and urban forest to explore species abundance	KS responded to red sticky notes first, which contained *things PSTs haven't got from KS class*; KS apologized for wrong information he has given	Concept map exhibition where class ended up very noisy. PSTs were presenting, asking questions, and arguing. Some conflicts happened but resolved.	Research Methods has usually been delivered through lecture because of its theoretical nature. AA took risk to incorporate group discussion, problem- & video-based learning.	EY presented a pecha kucha presentation
	Yielding and evaluating synthesis from PSTs	White flag (for great synthesis) and black flag (for poor synthesis)		Feedback was given 20 minutes before class ended	AA always evaluated PSTs' responses	
	Tolerating ambiguity	Some bizarre topics have been created by PSTs	Ambiguity presented by PSTs was taken lightly through jokes, evaluated, and clarified by KS	Some ambiguous concepts from PSTs were found during group discussion and exhibition. KS only observed and took notes. Correction was made in the end of the class.	Several ambiguous titles of research were tolerated by AA. AA also gave suggestion on how to revise the title if PSTs wanted to.	
	Re-balancing assessment	1. PSTs' results of using variable circular-plot to estimate bird numbers 2. PSTs' mapping of biodiversity 3. PSTs' mapping of species abundance 4. PSTs' paper	1. PSTs' presentation 2. PSTs' questions 3. Synthesis games (*bermain dadu*) 4. PSTs' paper	1. PSTs' sticky notes 2. PSTs' concept maps 3. PSTs' academic article	1. Interactive discussion 2. Venn diagram drawing 3. PSTs' process of thinking about data analysis result 4. PSTs' paper	1. PSTs' pecha kucha presentation 2. Weekly progress/report 3. Pop-up books 4. Individual contribution during weekly discussion
	Changing timetable	2 minutes as bonus time	-	5 minutes additional time for group discussion was allocated	30 minutes extension each meeting	More meetings have been scheduled for presentation and consultation
	Providing space for communication	'expert' and 'host' group discussion where PSTs rebuilt focus questions of their field survey	'expert' and 'host' group discussion about the existence of biotic and abiotic components measured by statistical formula	Groups based on PSTs' achievement. During exhibition too, PSTs shared ideas and some were observed arguing. The exhibition was done in 3 cycles.	Small group discussion	Weekly meeting was designed as a forum to present weekly progress and hold discussion session. Feedbacks from others were highly desired in finalizing the product.

	Adjusting class layouts	Small circles	Small circles	Small circles	Small circles	Rows
TEACHING FOR CREATIVITY	**Exploring & awarding PSTs' curiosity**	Modified KWL strategy; a lot of questions were raised by PSTs	All questions were accommodated by KS	During the exhibition, PSTs give questions, suggestions, and rebuttals on sticky notes and put them on the wall. All these sticky notes were collected and evaluated by KS	Mapping problems and plan of actions to resolve them	Every week new ideas were explored together in class. The process of making pop-up books were done outside of class time
	Instructing teamwork among PSTs	1. Jigsaw 2. Group Investigation 3. Group presentation	1. Jigsaw 2. Group Investigation 3. Role play 4. Group presentation	1. Group discussion 2. Exhibition of mapping	1. Peer discussion 2. Group discussion 3. Role play	To create pop-up books in a small group. The pop-up books will be used as instructional media for primary and secondary schoo students
	Encouraging problem-solving by PSTs	Field survey was designed based on systematic thinking. Gradually PSTs completed a focus question, aims, significances, and methods for their final report.		1. Spontaneous problem solving were performed when PSTs answered visitors' questions and gave responses to visitors' rebuttals about their teammate's concept map 2. Any disagreement upon friends' references needed to be discussed straight away. If no consensus was met, it should be written on the red sticky notes.	1. Problem-based learning [what we know, what we need to know, & plan of action] 2. Think outside the box: generating unique ideas for 3 different cases/pictures	PSTs often encountered problems during the making of pop-up books (e.g. folding paper, printing pictures, drawing etc). Unsolved problems were discussed in class with peers and EY
	Building PSTs' confidence	Fair chance to speak up during group discussions	Fair chance to speak up during group discussions	1. PSTs took turn to play several roles during exhibition 2. During exhibition, mos PSTs were seen confident in arguing and giving advice to other groups.	With an aid called Certainty of Response Index	'You can do this. This projec aims at sharpening your creativity to use junks to create instructional media'; Weekly presentation boosted PSTs' confidence
	Building PSTs' persistence	Grouping methods & members were varied	Role play in the group discussion; all PSTs must be	In 3 weeks, learning goals were presented in same	All tasks were successfully accomplished. PSTs were	Every week PSTs need to report their group progress by

			prepared to be pointed by KS to present results of their discussion	learning method. Persistence was built as the concept map creator was not given chance to present their works. Other members instead.	self-driven; PSTs seemed enthusiast and keen	presenting one page of their pop-up book and receive feedbacks from peers. Then they will need to gradually revise their pages until a pop-up book is complete. Pop-up book is about exercising again and again. The progress was monitored by both peers and facilitator
	Encouraging innovation/new ideas/critical thinking/new products	Basic clinometer, mapping of bird abundance, mapping of density in vegetation, and short report	Dice with different colors	Concept maps	Title and research questions of CAR & qualitative research based on three pictures about environmental issues, Venn diagram, six thinking hats in designing CAR	Pop-up books; The use of soil and sand which were evaluated by EY through justification from Biology perspectives.
	Encouraging risk-taking and mistake-making by PSTs	'Just be confident, keep calm, and answer the questions given by your friends'	1. 'Please speak louder, it's okay. You need to be heard by your friends' 2. Several PSTs admitted that they did something wrong or did not accomplish the task assigned	1. During exhibition, three colors of sticky notes were used by visitors (green for questions, yellow for suggestions, and red for rebuttals) while visiting exhibition stand. 2. PSTs gave opinion without hesitation although some concepts were noticed a bit misleading	'Just write what is on your mind. Do not think whether it is wrong or right. When an idea crosses your mind, just jot down'; 'There is no right or wrong, we value your opinion'; 'Which hat comes first, no problem. Explain to us the reasons behind the decision'	Mistakes were not penalized. Good ambience of discussion was felt during the in-class discussion. Feedbacks were given and received in positive manners.
	Encouraging synthesis by PSTs	Create synthesis through *bermain dadu* about floristic physiognomy, and birds	Create synthesis by combining 3 words from 3 different streams (e.g. sociocultural, economy, & ecology) through *bermain dadu*	In the end of exhibition, the stand keeper presented synthesis of arguments, advice, and problems emerged in the session. Another member of the group was also invited to deliver unsolved problems during the session.	PSTs synthesized in the end of the meeting by giving keywords only	PSTs created short essays after EY's pecha kucha presentation; Following weekly presentation, a recap has been provided by PSTs

	Designing learning where creativity is demonstrated in class or outside of class time	✓	✓	✓	✓	✓
	Giving autonomy to PSTs in accomplishing creative tasks	✓	✓	✓	✓	✓
CREATIVE LEARNING	**Providing sequence of learning activities from a variety of sources and perspectives**	Place-based learning and ideas gained from the workshop on creative pedagogies	Place-based learning, statistical analysis, and ideas gained from the workshop on creative pedagogies	Creative pedagogies (concept map exhibition), yoga (refreshment 3-5 mins)	Ideas gained from the workshop on creative pedagogies, problem-based learning, video-based learning	Ideas gained from the workshop on creative pedagogies, project-based learning
	Performing reflective action in the class	Through modified KWL strategy with colorful sticky notes	Brainwrite on 3 different colors of sticky notes	Brainwrite on 3 different colors of sticky notes	Brainstorming, verbally delivered, using GoSoapBox	Brainstorming, verbally delivered,
	Providing PSTs with meaningful learning for their immediate needs and interests	Preparing PSTs for field study	Preparing PSTs for their final year thesis writing	Preparing PSTs for writing an academic article, a proposal for seminar, and thesis for their final year	Preparing PSTs for writing thesis in their final year	Preparing PSTs to create instructional media which is an important skill in becoming teachers
	Providing PSTs space for owning and control their learning	1. PSTs did 3 pre-observations to the fields and learnt how to listen to bird chirps in advance 2. Within short period of time, PSTs accomplished all assigned tasks	1. PSTs did independent exercises on statistical calculation at home 2. PSTs were enthusiast to present their findings 3. During the group discussion PSTs were pro-active in learning with peers	PSTs were excited and enthusiast to do the presentation since arguing, defending, and reasoning were important skills to acquire before their thesis defense. Everyone brought concept maps of their academic articles to class. During group discussions, everyone took part.	PSTs seemed enthusiast and keen to learn; Some PSTs stated that they gained deep understanding in this meeting as varies learning models were implemented.	PSTs learnt from Youtube and their seniors' tutorial videos about creating pop-up books; Creativity which was supported by justification. PSTs could defend or present reasons behind choices of materials, for example, when asked by peers and facilitator
PRESENTING ENVIRONMENTAL LEARNING IN SOME RESPECTS	**Affective dimension**	-	KS told some PSTs to pick the rubbish up and throw them in the bin.	PSTs were encouraged to use the used sticky notes from previous activities	PSTs were encouraged to use used paper for drawing Venn diagram; PSTs were asked if during PLP program they have noticed any environmental	To raise awareness on little things to reduce impacts of global warming; To nurture PSTs' awareness towards environment or what has happened in their surroundings

					issues integrated in the classes they observed	
	Cognitive dimension	In *bermain dadu* to find connections among species in some types of ecosystem	PSTs learnt about biotic and abiotic components from sociocultural, ecology, and economy		AA introduced several environmental issues through pictures and interactive discussion; AA introduced environmental learning to be incorporated in CAR	Through brainstorming session in the beginning of the meeting and pecha kucha presentation, EY delivered these three interrelated areas; To create pop-up books for sharing knowledge to others; The content of pop-up books was created or based on PSTs' knowledge. Some of misleading information was corrected by EY.
	Intentional dimension	-				To use trash or to recycle unused stuffs in creating pop-up books. Trashes used in the project such as straw, cigarette, plastic bags, brochure, and calendar.
	Respons-ibility	Sharpening sensitivity towards nature	Reminding PSTs to use sticky notes effectively; Reminding PSTs to look at their surroundings, be more aware of the environmental issues, and take action if needed	Some PSTs were seen using used sticky notes	AA encouraged PSTs to use the other side of the Six Thinking Hats worksheet to draw their Venn diagram on.	Not only aiming at using recycle trash, PSTs also did reflection on how they personally reduce plastics use in their daily life; *Subak* was introduced in the fourth meeting.
	Co-rrespondence	Linking theory and practice about biodiversity and species abundance mapping through place-based learning			The introduction of eco-school in Bali and the case of Sexy Killers (coal mining in Indonesia which killed the surrounding society) and how to respond; AA checked PSTs understanding and action taken on some climat	When EY stated about an environmental issue (e.g. waste needs to be processed), EY made connection with PSTs' surroundings (e.g. the case of Tukad Badung river); The ability to present what has been gained from some courses especially about

					crisis issues during his presentation	environmental learning onto pop-up books; Ideas to incorporate issues regarding *subak* was also elaborated by EY.
	Respons-ability		Before the class ended, PSTs looked around their class and picked up trash around them			The use of rubbish or used paper as materials of pop-up book was encouraged. PSTs will be given more points if they can accomplish this task
PSTs' emoji stickers		1. ☺ = 10 ☹ = 1 2. ☺ = 10 ☹ = 1	1. ☺ = 16 ☹ = 3 2. ☺ = 19 ☹ = 0	1. ☺ = 23 ☹ = 2 2. ☺ = 20 ☹ = 2	1. ☺ = 14 ☹ = 0 2. ☺ = 17 ☹ = 0 3. ☺ = 9 ☹ = 0 4. ☺ = 7 ☹ = 0	1. ☺ = 9 ☹ = 2 2. ☺ = 17 ☹ = 0 3. ☺ = 11 ☹ = 0 4. ☺ = 12 ☹ = 0 5. ☺ = 16 ☹ = 0

Appendix 4 – *Subak* Cultural Landscape (SCL) Fact Sheet

Subak is a 2000-year-old traditional Balinese agricultural practice that combine four elements of organisation, such as rice fields, irrigation and water sources, farmer membership, and networks of temples. *Subak* is a big unit of ecosystem that encompasses not only agricultural land but also watershed, mountains, lakes, bushes, moors, trenches, and ponds. *Subak* has been added to UNESCO's World Cultural Landscape Heritage in 2012, incorporating several areas: Supreme Water Temple of Ulun Danu Batur Temple, Lake Batur, SCL of the Pakerisan Watershed, SCL of the Catur Angga Batukaru, and the Royal Water Temple of Taman Ayun.