Pragmatic critical realism and Mixed methods in Inter-disciplinary Research-Management and Information systems

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Abstract

Mixed methods research (MMR) traditionally follows one paradigm based on established typologies.However, this study deviates from conventional research paradigms by combining two paradigms in onestudy. Specifically, it employs a critical realist method to analyze data, complemented by a pragmatistapproach. This combination allows for the exploration of various phenomena in multidisciplinary research,such as cyber risk management, which intersects with management and information systems. By delvinginto the causal mechanisms underlying observed social and organizational phenomena, the pragmatic criticalrealism (PCR) approach, in conjunction with MMR, offers a valuable framework for understanding thestudy's findings. Importantly, PCR has not been widely discussed or adopted in a multidisciplinary contextfor examining mixed data and advancing theory using MMR. This approach can be applied tomultidisciplinary research in different contexts, enabling a deeper understanding of research participants'perspectives, the observable events resulting from those perspectives, and their causal relationships. Thestudy systematically reviews the literature on pragmatism and critical realism in the field of managementand information system; compares and combines these two research paradigms to identify common groundand explore their potential for developing a new framework to address interdisciplinary research questions.As a result, a new multiparadigm conceptual model has been established that integrates pragmatism andcritical realism, making an original contribution to the field of mixed methods research. The study suggeststhat academics and researchers in management and information systems should broaden their use ofmethodologies and embrace interdisciplinary thinking in order to advance theoretical debates within theirdiscipline.

Keywords: Pragmatic Critical Realism, multidisciplinary, mixed method, management, cybersecurity, information system.

1. Introduction

The last decade has seen substantial growth in mixed method research related to interdisciplinary research. Mixed method researchers have never had greater access to conceptual and practical resources (Giardina, 2017). It is critical to note that while mixed method researchers have been described as part of a growing and shifting community of practice (Smith and Sparkes, 2016), there are still many challenges that remain unresolved in their work. Similarly, several authors discuss the role of interdisciplinary teams in conducting research. Phoenix et al. (2013) argued that we should tolerate differences in paradigm within research groups and abandon a single paradigm to frame interdisciplinary work. It is nevertheless important not to overlook that tension exists between "the necessity of undertaking funded research (which comes with methodological concessions, especially if mixed methods are used) and maintaining epistemological and ontological coherence" (Giardina, 2017). Research that approaches interdisciplinarity from a strategic perspective is likely to find itself paradoxically attempting to maintain theoretical incommensurability while trying to find practical commensurability. While these reflections are helpful in meeting the demands of interdisciplinarity in practice, they lack philosophical balance and are a compromise (Wiltshire, 2018). Therefore, this study suggests revisiting the single paradigmatic approaches that have dominated mixed method social science research in recent years This study examines the potential of critical realism and pragmatism as a meta-theoretical framework for conducting and developing mixed method research (Wiltshire, 2018).

This paper systematically reviews the literature on pragmatism and critical realism in the field of management and information systems using content and thematic analysis (Thomas and Harden, 2008) (Seuring and Gold, 2012). It identifies the common grounds between both paradigms by comparing and analysing them to explore their usefulness in the use of PCR in mixed method along with retroduction theorization in multidisciplinary fields.

2. Critical realism and Pragmatism

Critical realism is purely realist from an ontological perspective; that is, there is a physical reality of objects independent of how they are perceived (Phillips and Pugh, 2010). However, on the epistemological level, it is not fully realist. According to Bhaskar (2008), critical realism believes that knowledge is a social product and can be influenced by the researcher's value system. Bhaskar further states that entities do exist independent of human perception, but we can only study them under certain descriptions (McAvoy and Butler, 2018; Bhaskar, 2008). In the words of Goerner (1999), "Untangle the weave, but keep the tangle and observe the patterns it produces."

On the other hand, pragmatism, as an alternative paradigm, does not engage with the contentious issues of truth and reality. Philosophically, pragmatism accepts that there is a singular and multiple reality that can be empirically studied, and it focuses on solving practical problems relevant to real-life situations. That is why pragmatism frees researchers from the constraints imposed by the dichotomy between post-positivism and constructivism (Creswell and Clark, 2007, p. 27). Researchers do not need to be tied to a specific research method or technique (Robson, 2016).

An important aspect of research paradigms is that they often fall along a continuum, with positivism at one end and interpretivism at the other. Critical realism operates on this continuum by combining positivism's objective reality with interpretivism's socially constructed knowledge (Saunders et al., 2016). However, pragmatism poses a challenge to this continuum as its fundamental interests are orthogonal to it and do not fit neatly within it. Unlike the other research paradigms, pragmatism is not concerned with metaphysical questions of ontology and epistemology (Mingers, 2004). Instead, pragmatism argues that concepts are only relevant if they support action and that research should aim to solve problems and provide practical solutions for future practices (Saunders et al., 2016). Additionally, pragmatism encompasses various varieties that differ along multiple dimensions (Biesta, 2010). From this perspective, pragmatism believes that knowledge is socially constructed and can provide practical solutions for everyday problems (Johnson and Duberley, 2000).

3. Pragmatic critical realism

Several scholars are of the viewpoint that critical realism and pragmatism are not only compatible, but also suggest that recognizing them as a combined research paradigm (pragmatist-critical realism) could help address their respective limitations. Pragmatist-critical realism (PCR) can be best described as a paradigm that seeks to offer practical and liberating solutions to issues that arise from our socially constructed understanding of an external, objective reality (Heeks et al., 2019). Pragmatic critical realism (PCR) believes that humans are incapable of comprehending a transcendental reality because they lack the necessary cognitive and linguistic means. Consequently, science is a social activity in which people intervene and manipulate intransitive realities, which are then confronted and changed by socially constructed transitive theories (Wong and Fui, 2012).

The compatibility of pragmatism and CR is grounded on three bases. Firstly, pragmatism is orthogonal to the metaphysical paradigm continuum, and therefore, there is no barrier to combining pragmatism with any of the paradigms. A second reason is that both pragmatism and critical realism share the same purpose from a teleological (end or purpose) standpoint as a "third way" between positivism and interpretivism: critical realism from a methodological and ontological perspective (Sousa, 2010); pragmatism from a methodological perspective (Morgan, 2014). Furthermore, it is worth noting that in the 21st century, there has been a growing body of literature on pragmatism that aims to overcome its three main limitations by reinterpreting the theory. This emerging approach effectively combines critical realism with pragmatism; however, very few writers have yet to explicitly acknowledge this potential fusion.
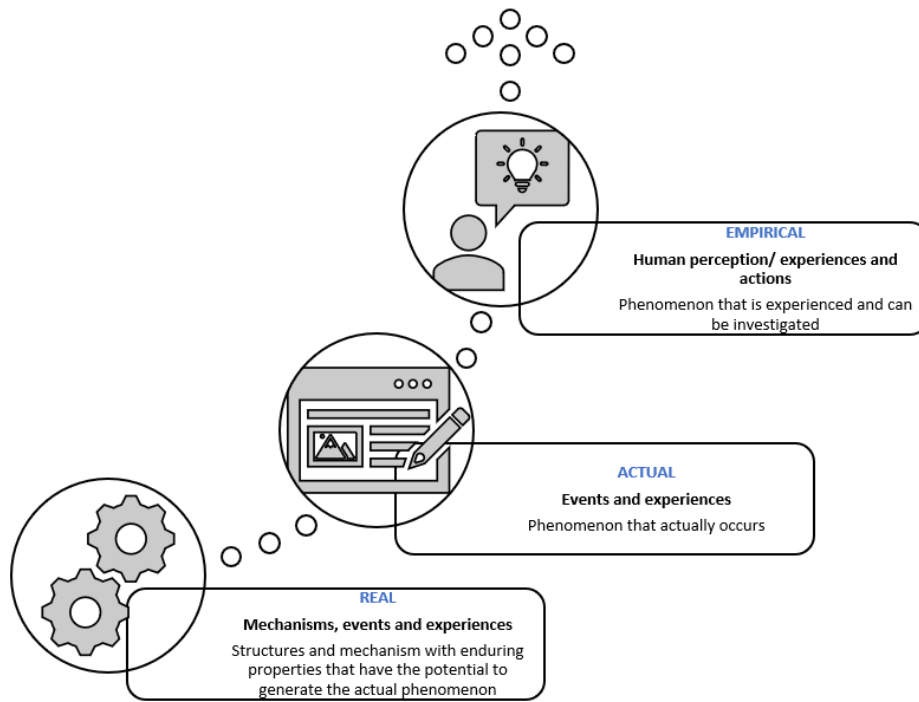
Fig 1. PCR ontological levels

PCR takes a clear and structured approach to addressing three deficiencies. The PCR ontology is divided into three levels: the real domain, the actual domain, and the empirical domain (see Figure 1). In the real domain, there are generative mechanisms that produce observable events without being influenced by human thought (Henfridsson and Bygstad, 2013). The actual domain consists of events that result from causal processes within specific social or physical structures in a particular context (Williams and Karahanna, 2013). The empirical domain involves experiences and observations, including the facts generated within the actual domain. While these facts are not objective, they are influenced by the surrounding context (Bhaskar, 2008).

PCR helps explain the practical outcomes of interventions by examining the causal mechanisms in the real domain. This approach provides a convincing basis for generalizing outcomes across different contexts and increases the credibility of certain interventions. Building consensus around the effectiveness of interventions is crucial in establishing their validity according to pragmatism. By contrast, PCR tests knowledge-claims based on these two bases - which may be concepts, ideas, or interventions (Heeks et al., 2019) (see Figure 2).
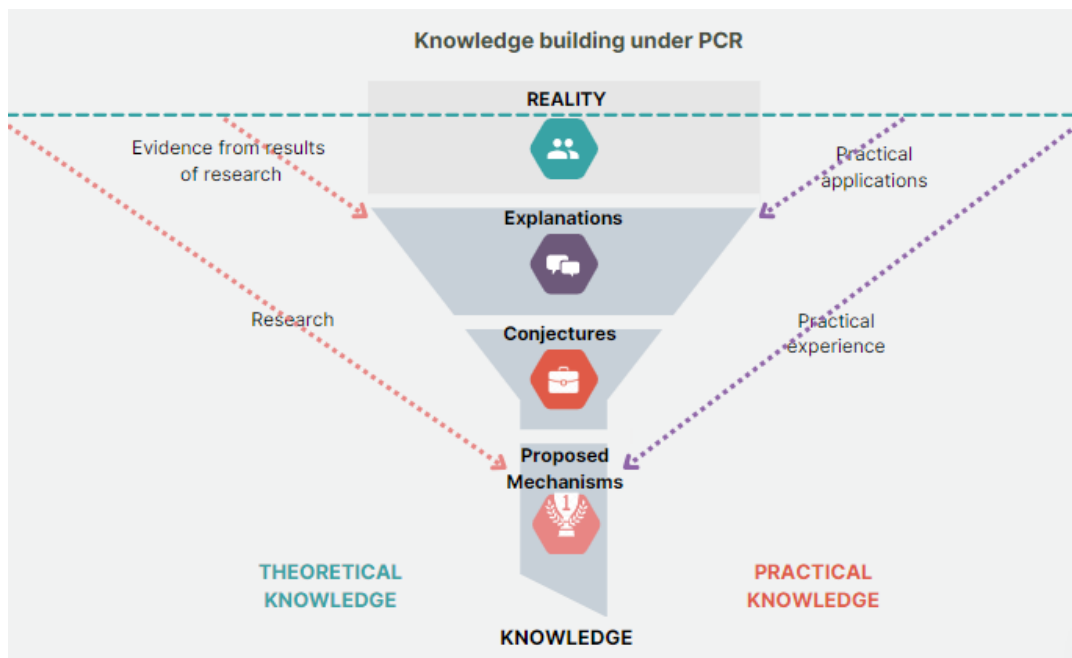
Figure 2: Knowledge-building under PCR

Adapted from Johnson and Duberley (2000)

PCR addresses the third shortcoming by drawing on the axiology of critical realism. It focuses on what critical realism values in research and what it does not value. Emancipation is at the core of critical realism, which means recognizing that social structures and mechanisms can sometimes lead to oppressive and unequal events and processes (Heeks and Wall, 2018:4). Therefore, PCR defines its purpose and assesses its practice based on how effectively it generates events and processes that counter oppression and promote equity.

Finally, we can explore how pragmatism addresses weaknesses within critical realism or adds value to it. There is still work to be done in this area, particularly regarding critical realism's connection to practice. While the philosophy does reflect and engage with practice (Ram et al., 2015), it cannot always be applied in a practical way, such as in retrospective project analysis (Mungai 2018) and theory-oriented research (Thapa and Omland, 2018). Through pragmatism, multidisciplinary research like cybersecurity risk management research becomes stronger and action oriented. Moreover, by taking this practical action, critical realism can also fulfil its axiological promise of liberating the oppressed or disadvantaged by addressing sustainability and resiliency.

4. Management research and PCR

In the natural and social sciences, pragmatic critical realism argues that real structures exist and function independently. A causal claim is made based on our best observations and using experiments in a closed system that is not reflective of the real world. Especially for the social sciences, this point is crucial because human behaviour is heavily influenced by human interpretation. To this end, social science's epistemological commitment is to identify the structures that shape behavior through social phenomena. As a result, a hermeneutic understanding of organizational behavior is crucial in identifying unacknowledged yet causal structural factors (Wong and Fui, 2012).The causal powers of human action cannot be observed directly; they should be inferred theoretically through studying relational effects. Inferences like these pose a problem of legitimacy because they will always be susceptible to a fallibility argument (Bhaskar, 2008). Additionally, generative mechanisms may remain dormant unless they are activated by practice. The pragmatic-critical realism philosophy offers opportunities to practice a variety of methodological techniques that combine both inductive-deductive and qualitative-quantitative methods and are assessed or reassessed in the light of practical adequacy. In subjectivist epistemology, pragmatic-critical realists hold that no methodology is superior to another (Wong and Fui, 2012).

Furthermore, mathematical representations cannot be used to analyze all research. A covariance analysis in statistical techniques, for example, does not provide sufficient insight into causation relationships.

Henceforth, pragmatic-critical realism is committed to this epistemological commitment. In order to interpret and make sense of the data, qualitative analysis is necessary (Sayer, 1997). Moreover, pragmatic critical realism rejects the theory of neutral observational language. Since truth can only be attainable through personal value-laden practices, researchers are always biased in their research processes. Thus, researchers practice critical reflection on their intellectual assumptions, which invariably leads them to take an active and unique role in the management research process (Wong and Fui, 2012).

5. Information System (IS) research and PCR
Traditionally, most research on information systems (IS) and systems development, particularly in the US, has been guided by a positivist or empiricist philosophy. However, during the 1980s and 1990s, different philosophical approaches started to emerge. The main alternative approach is interpretivism or conventionalism, which highlights the meaningfulness of the social world. This approach includes various strands such as ethnography, ethnomethodology, hermeneutics, and phenomenology. Other approaches rooted in different philosophical traditions include critical theory, postmodernism, and actor-network theory (Mingers, 2004).

These diverse philosophical approaches have elicited different reactions. Some researchers believe that certain methods are more suitable for specific research questions or situations (Robey, 1996), while others argue for a trans-paradigmatic approach, advocating the combination of philosophically distinct research methods (Mingers, 2001). It is worth noting that this diversity is not unique to information systems; other social sciences such as organization theory, sociology, economics, and geography also experience similar divisions.

However, it is often overlooked that these underlying philosophies of science and social science themselves face significant problems. Therefore, a combination of philosophies, namely pragmatism and critical realism, has been proposed as a means to resolve or dissolve these issues and provide a consistent and coherent philosophical foundation for information systems (Mingers, 2004).

In recent years, there have been convincing arguments that since information systems are conducted within social organizations, social science is also relevant. This opens up major philosophical debates concerning the nature of social science in relation to natural science (Mingers, 2001). Critical realism is particularly important for information systems because it allows us to adopt a realist stance while acknowledging the critiques of naive realism. It encompasses both natural and social science, making it applicable to the main domains of information systems. Furthermore, critical realism aligns well with the reality of information systems as an applied discipline (Mingers, 2003) (Bhaskar, 1997).

6. PCR for multidisciplinary studies (cyber risk management)
This section considers cybersecurity risk management as an example of multidisciplinary study (falling under both management and information systems realms). In the field of social science, pragmatic critical realism has added value to the development of theory in various areas. To date, it has been unable to significantly contribute to the development of cybersecurity and risk management theory. As a result of integrating theoretical understanding with practical applications, PCR transcends the positivism thesis. This provides an essential foundation for developing effective and applicable cybersecurity and risk management frameworks (Mearns, 2011).

The PCR paradigm encourages an interdisciplinary approach, integrating knowledge from various disciplines, sources, and perspectives, and recognizing that reality is complex and multifaceted (Mearns, 2011). Social scientists who adopt pragmatic critical realism believe that knowledge develops and changes as theories replace one another. Therefore, they seek to "prove" their hypotheses by examining the consistency of theories and explanations. In these studies, researchers emphasize studying systems in their context and accept that multidisciplinary approaches may strengthen the reliability and validity of conclusions (Elder-Vass, 2022).

Pragmatic Critical Realism (PCR) offers a holistic and practical approach to address complex cybersecurity challenges in oil and gas projects by providing an understanding of the real domain and nature of reality (Mearns, 2011) (Wong and Fui, 2012). This involves an in-depth analysis of cyber threats, vulnerabilities, and the technology infrastructure in the oil and gas industry in the context of cybersecurity. Organizations

can improve their understanding of cybersecurity by gaining insight into the real domain. Moreover, CR asserts that there is a reality that exists independently of our perceptions, but we always interpret this reality through our interpretations (Mearns, 2011) (Wong and Fui, 2012). When it comes to oil and gas cybersecurity, it means recognizing that there are real threats and vulnerabilities, but they are interpreted and understood differently depending on the tools, methodologies, and interpretations used. Similarly, the concept of layered reality is often used in CR to describe a world characterized by empirical events and experiences, as well as actual mechanisms and structures (the real) (Wong and Fui, 2012). This can be translated into understanding that underlying mechanisms (like software flaws, human behaviours, or system interdependencies) cause certain cyber-attacks or vulnerabilities (empirical). On the other hand, the pragmatic aspect of PCR emphasizes the significance of practical solutions and outcomes (Kaushik and Walsh, 2019). In studying cybersecurity, no one can deny the importance of theoretical understanding; however, the end goal is to formulate actionable strategies and solutions that are effective in mitigating real-world cyber risks.

7. PCR, mixed-method research (MMR), and theory development

Social science research that integrates qualitative and quantitative methods is primarily governed by Peircean pragmatism. This approach involves forming abductive hypotheses and testing and confirming them deductively and inductively (Feilzer, 2010). However, MMR informed by critical realism has received little attention (Mukumbang, 2021). While some articles emphasize the integration of qualitative and quantitative methods in critical realist research (Lipscomb, 2011; Zachariadis et al., 2013; Hurrell, 2020), the process of retroductive theorizing to test and theorize hidden mechanisms has not been elucidated (Jagosh, 2020). The purpose of this section is to illustrate how pragmatism and critical realism, combined within PCR, complement each other to offer a robust framework for integrating qualitative and quantitative methods and a useful framework for theorizing.

A qualitative approach is frequently used in MMR to explain quantitative findings in social science. However, many cases lack in-depth theory, which is necessary when dealing with open systems (Mukumbang, 2021). The use of theoretical traditions and theory-driven approaches emphasized in PCR can assist in understanding complex causal mechanisms in this regard. Researchers supporting this stance argue that statistical analysis can easily align with PCR (Pratschke, 2003).

PCR offers a unique approach to research by combining Peircean pragmatism with critical realism. Critical realism advocates for retroduction, which involves using assumptions to explain events by postulating mechanisms. Pragmatism, on the other hand, relies on abductive hypotheses and the deductive and inductive testing of these hypotheses. The retroduction process in critical realism is empirical, as it reconstructs basic conditions to gain a deeper understanding of causality. Peircean pragmatism complements this approach by offering abductive-deductive-inductive cycles, further enhancing the theorizing process. In PCR, abduction is utilized in various forms, as described by Umberto Eco (over-coded, under-coded, creative, and meta-abduction). Having a range of explanations and theoretical mechanisms available opens up a wide range of possibilities for exploration and testing. Retroduction and abduction are closely related in PCR and are viewed as complementary. The relationship between qualitative and quantitative methods in social science research enhances the process of theory development, making PCR an effective method for integrating qualitative and quantitative research methods. PCR emphasizes the production of knowledge that is theoretically sound (critical realism) as well as practically relevant and actionable (pragmatism). MMR facilitates this by providing a more holistic view of the research problem, allowing for the development of solutions that are effective and grounded in real-world contexts. Furthermore, the use of MMR in PCR can help address the limitations of each individual method. For example, qualitative methods can provide depth and context to the findings obtained through quantitative methods, and vice versa. This integration of methods within the PCR paradigm ensures a more robust and comprehensive approach to multidisciplinary research.

Researchers in multidisciplinary fields should seriously evaluate adopting a critical realist approach in order to alleviate disciplinary conflicts. In a critical realist perspective, the debate about whether management is a science, or a technology becomes irrelevant since both are important for developing theory and for understanding (Mingers, 2000).
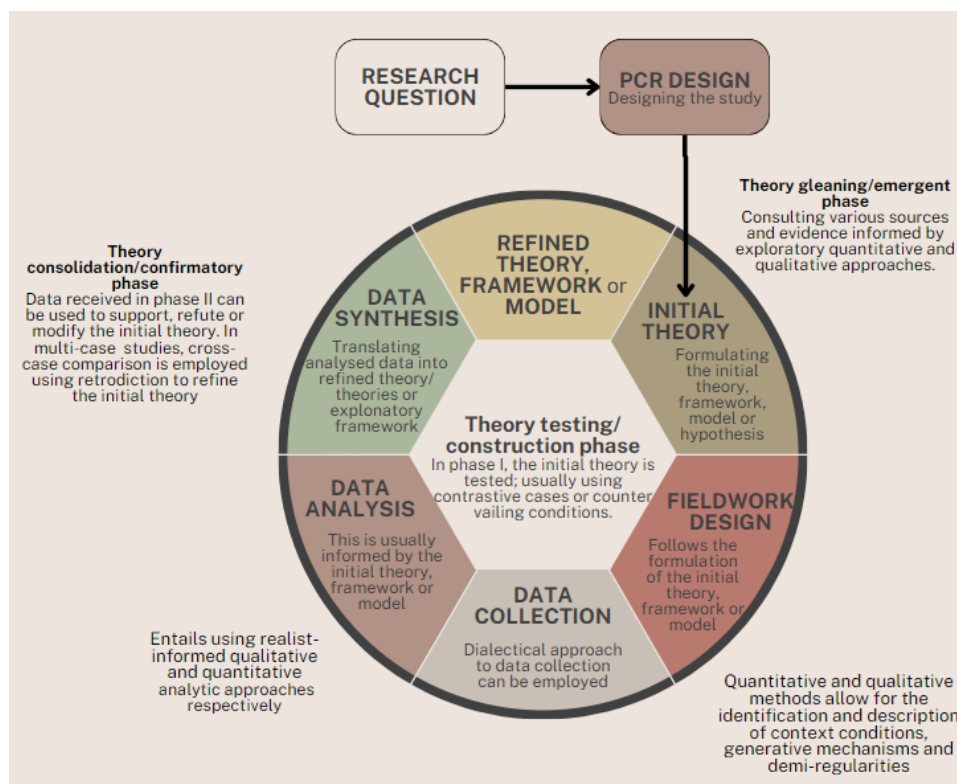
Figure 3: PCR Theory development Process

Adapted from Mukumbang (2021)

8. Conclusion

Pragmatic critical realism (PCR) offers a strong and comprehensive framework for conducting social science and information system research using mixed methods. However, research on mixed methods within the context of Pragmatic Critical Realism (PCR) is not as extensive as other paradigms. Therefore, it is necessary to address theoretical gaps and explore ways to improve rigor and depth within this framework. In the past, multidisciplinary research heavily relied on quantitative methods to understand organizations and individuals by quantifying and interpreting statistics. This approach is no longer sufficient because it does not acknowledge the complexity of cross-disciplinary issues like cybersecurity. By adopting a pragmatic critical realist methodology, researchers can contribute to a better understanding of these complex phenomena through improved data analysis. Initially, critical realism was defined to explain its impact on our understanding of 'reality.' Later, it was argued that incorporating pragmatism into philosophy would strengthen its foundations. This approach enables the examination of multiple perspectives, social constructs, layered reality, and theoretical development in management and information systems research. Therefore, academics and researchers should be open-minded and expand the use of methodologies to advance theoretical debates within their disciplines.

In summary, the PCR approach facilitates the analysis of complex and contradictory social systems, including their structures and mechanisms. This makes PCR an ideal tool for understanding multidisciplinary studies, which involve both natural and social aspects affected by actions and reactions (Joseph, 1998).

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