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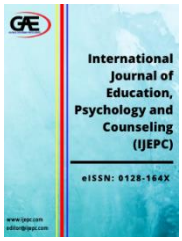

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NEEDS ANALYSIS OF DEVELOPING INSTRUCTIONAL TEACHING PLAN IN WATER CONSERVATION FOR PRIMARY SCHOOL

Asnida Ismail[1], Nor Asniza Ishak[2*]

[1] Institute of Teacher Training, Penang Campus
Email: asnida.ismail@ipgm.edu.my
[2] School of Educational Studies, Universiti Sains Malaysia
Email: asnizaishak@usm.my
[*] Corresponding Author

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Abstract:

This study utilizes a qualitative methodology to explore the development needs of instructional teaching plans to improve knowledge, attitudes, and practices related to water conservation among primary school students. Through semi-structured interviews and drawing analysis, participants are selected from three primary schools in Penang's north district using purposive sampling. This approach ensures the gathering of detailed and pertinent data by involving four science teachers and five students who offer insights into the instructional requirements and obstacles encountered in teaching water conservation. The primary objective is to grasp the specific needs, perspectives, and learning preferences of both students and teachers. It facilitates the creation of instructional materials that resonate with the target audience, leading to increased engagement and effectiveness. The research is motivated by the critical role of needs analysis in guiding educational content development, underscoring the significance of aligning instructional materials with the distinct demands of the educational setting. By manually analyzing interview data thematically, the study sheds light on issues such as time constraints, resource shortages, student readiness, teaching methodologies, and student needs. Additionally, drawing analysis reveals prevalent misconceptions, indicating a limited understanding of pollution causes/effects and conservation concepts. This investigation adds to educational research and seeks to enhance the implementation and impact of water conservation practices in primary education.

Keywords:

Needs Analysis, Water Conservation, İnstructional Plan, Primary School

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Introduction

Water conservation is a growing crisis affecting many parts of the world. Hence, educating young individuals about the significance of preserving it is crucial (Byker & Ezelle-Thomas, 2021; Wang et al., 2022). The need for this research study stems from the critical role of water conservation in addressing environmental concerns and securing long-term sustainability (J. Wang et al., 2022; Lamprom et al., 2023). Recognizing water's finite nature and essentiality underscores the importance of instilling conservation values early, fostering lasting benefits for individuals and communities. Thus, educating primary school students on water conservation cultivates a sense of stewardship, ensuring the preservation of this indispensable resource for future generations. Focusing on primary school students is strategic, given that this developmental stage is crucial for shaping habits and attitudes (Hanifah & Mohamad Suhaily Yusri, 2016). Moreover, it provides an ideal opportunity to cultivate a sense of responsibility toward water conservation (Singha et al., 2022).

Research studies shown that innovative teaching methodologies, including 5E learning cycle and instructional model have proven effective in enhancing pupils' comprehension and academic performance across disciplines (Joswick & Hulings, 2024). These approaches emphasize active participation, hands-on learning, and personalized instruction, which are crucial elements for engaging young learners in topics like water conservation.

Developing a teaching instructional plan focusing on water conservation for primary schools is essential in cultivating awareness, attitudes, and behaviors that are conducive to sustainable water usage practices. The needs analysis study is essential as it dictates the development approach for content materials in the instructional teaching plan (Darici, 2016). Understanding the specific needs, perceptions, and learning preferences of primary school students and teachers is pivotal in designing instructional materials that resonate with them. It also ensures they align with their specific requirements, enhancing their engagement and effectiveness (Whannell & Yeigh, 2017).

Therefore, to equip primary school students to enhance their level of knowledge, attitudes, and practices in water conservation activity, the study aims to gather the necessary data to develop the teaching instructional plan. Thus, the objective of this study is:

i. To analyze the need to develop an instructional teaching plan to enhance knowledge, attitudes, and practices in water conservation.

Literature Review

Water is vital for life and ecosystems, serving as a fundamental necessity and essential resource for all living organisms (Benninghaus et al., 2018). Yet, its availability and quality are increasingly threatened by pollution and overuse (Karataş & Karataş, 2016; Khan et al., 2022). The consequences of water pollution are severe and wide-ranging, affecting human health, aquatic ecosystems, and biodiversity. Moreover, climate change exacerbates water scarcity and quality issues, further exacerbating the challenges in managing water resources sustainably (Zakria Zakar et al., 2012).

Water conservation has emerged as a critical strategy to safeguard water resources and ensure their sustainable use for future generations. Water conservation activities encompass a range of measures to reduce water wastage, improve water use efficiency, and preserve natural water

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sources. Moreover, effective water conservation education is essential in fostering a culture of water stewardship and promoting sustainable behaviors among individuals and communities (Moglia et al., 2018). By enhancing knowledge, attitudes, and practices related to water conservation, individuals can mitigate water scarcity and pollution, thereby preserving water resources for present and future generations.

Educational initiatives on water conservation aim to empower individuals with the necessary knowledge and skills to make informed water use and management decisions. These initiatives involve raising awareness about the importance of water conservation, teaching practical water-saving techniques, and promoting responsible water consumption behaviors (Singha et al., 2022). Furthermore, cultivating positive attitudes towards water conservation is crucial for fostering a sense of environmental responsibility and encouraging proactive engagement in conservation efforts. Thus, by instilling values such as respect for water resources and appreciation for the interconnectedness of human activities and the environment, educators can inspire students to become advocates for water conservation in their communities (Sanchez et al., 2020). Practical engagement in water conservation activities is key to translating knowledge and attitudes into meaningful actions. In addition, hands-on experiences provide opportunities for students to apply what they have learned in real-world contexts and make a tangible impact on water conservation efforts.

In developing an instructional teaching plan for water conservation in primary schools, it is essential to consider various aspects of effective teaching strategies and instructional practices. Cutler & Graham, (2008) emphasized the importance of increasing students' writing time, fostering motivation for writing, and integrating computers into the writing program. This highlights the significance of providing ample time for students to engage in hands-on activities related to water conservation, motivating them to participate actively in learning about this crucial topic.

Furthermore, Graham, (2019) stressed the necessity of explicitly teaching strategies, skills, and knowledge to improve writing performance. Similarly, Walan & Mc Ewen, (2017) suggested the need for further investigations among primary school teachers to enhance their knowledge of instructional strategies. These findings underscore the importance of explicitly teaching primary school students water conservation concepts and skills to ensure effective learning outcomes. Moreover, the meta-analysis by Rogers & Graham, (2008) identified effective instructional writing practices, which can be extrapolated to designing effective instructional practices for teaching water conservation. Additionally, Graham, (2019) discussed changing classroom practices by increasing stakeholders' knowledge about writing, which can be applied to developing and actualizing visions for water conservation instruction at different levels.

Incorporating inclusive teaching strategies, as highlighted in the study by Li et al., (2022), can ensure that water conservation lessons cater to the diverse needs of students. Additionally, considering the availability of teaching and learning materials, as recommended by Naisianoi et al., (2020), is crucial for promoting optimal development in water conservation education. In conclusion, by drawing on research that emphasizes effective teaching strategies, explicit instruction, and the availability of resources, a comprehensive instructional teaching plan for water conservation in primary schools can be developed to engage students effectively in learning about this critical environmental topic

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As primary school educators, understanding the global context of water sources, pollution, and conservation efforts is crucial for developing effective teaching plans for water conservation (Campbell, 2004). Water conservation education is paramount in addressing the complex challenges posed by water pollution and scarcity. Therefore, by understanding the global context of water sources, pollution, and conservation efforts, educators can develop instructional teaching plans that effectively engage primary school students in learning about water conservation. Moreover, by enhancing knowledge, attitudes, and practices related to water conservation, educators can empower students to become active participants in safeguarding water resources and promoting sustainable water management practices in their communities. At the same time, through collaborative efforts between educators, policymakers, and stakeholders, we can work towards a future where water resources are protected, conserved, and sustainably managed for the benefit of all (Al-Nuaimi & Al-Ghamdi, 2022).

Research Methods

This research entails a qualitative study that utilizes a semi-structured interview approach and drawing analysis. Using purposive sampling, which involves selecting samples from individuals within the population who meet specific criteria to participate in the study, allows for precise, comprehensive, and meaningful information collection regarding the subject matter (Sharan B. Merriam, 2014). The study locations for data collection involve three primary schools in the north district of Penang. The selection of study locations considers the criteria of purposively selected study participants and closely matches the actual study sample.

Four science teachers and five students were selected as study participants for semi-structured interviews. Information regarding the teachers' backgrounds can be observed in Table 1. Purposeful sampling was employed to obtain qualitative data, allowing for information acquisition and understanding of the current phenomena unfolding at the study site (Creswell, 2008). A semi-structured interview protocol was developed, and this method enabled direct interaction between the researcher and participants, as well as teachers and students, emphasizing the research goals of identifying issues, challenges, and teaching instructional requirements. Consequently, data obtained underwent manual thematic analysis, with interview transcripts scrutinized according to predetermined themes and categories.

Table 1: Background of Teachers

Teacher's profile	Experience in teaching science	Academic Qualification
Science teacher 1 (ST1) Primary School A	21 years/head of panel science (7 years)	Bachelor's degree in science
Science teacher 2 (ST2) Primary School B	27 years/head of panel science (10 years)	Bachelor's degree in education
Science teacher 3 (ST3) Primary School B	17 years	Bachelor's degree in applied science
Science teacher 4 (ST4) Primary School C	6 years	Bachelor's degree in science

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Drawing analysis was used as a second data collection method due to its ease of preparation and enjoyable nature. Children's drawings reflect their thoughts and feelings as an alternative means to interpret their views Additionally, drawings are valuable for assessing students' understanding of scientific concepts and distinguishing between their alternative frameworks of understanding and scientific knowledge (Cardak, 2009a). Students draw water pollution and conservation activities to gauge their understanding of pollution causes/effects and conservation concepts. The sample for drawing analysis comprises 38 Year 5 students, 22 boys and 16 girls, from a primary school in Penang.

Semi-Structured Interview

Based on interview data analysis, findings from four teachers yielded three themes: 1) time constraints, 2) shortage of teaching and learning resources, and 3) student classroom readiness is low. Teachers express their concerns in dealing with time limitations in teaching science due to extensive syllabi, planning and preparing materials, and executing activities in class.

"*..takut tak dan nak masukkan tajuk-tajuk lain sebab silibus sains KSSR ni banyak…*" (ST2)
Fear of not having enough time to teach other topics due to the extensive KSSR science syllabus.

"…boleh dikatakan kekurangan masa la dalam nak merancang dan nak sediakan bahan bagi PdPc.." (ST2)
Experienced a shortage of time in planning and preparing teaching materials.

"…. Lagi pun topik jirim banyak sub topik dan aktiviti pun banyak nak kena buat bagi murid faham…. Kalau nak masukkan sub topik pemuliharaan air takut tak sempat nak habiskan silibus…" (ST3)
Matter topic has numerous subtopics and activities for student understanding. Adding water conservation might impede completing the science syllabus.

In addition, teachers indicate that a shortage of teaching and learning resources in teaching science contributes to less engaging learning sessions.

" *……nak kena rancang rancangan mengajar yang elok-elok…nak kena luangkan masa untuk cari idea…cari latihan dan aktiviti yang menarik minat murid….. semua tu makan masa… tak sempat nak buat…."* (ST4)
Effective lesson planning is required, which includes allocating time for idea generation and searching for engaging exercises and activities to capture student interest.

" *……boleh dikatakan kekurangan masa la dalam nak merancang dan nak sediakan bahan bagi PdPc.…itu pun kalau sempat la..."* (ST2)
Shortage of time and resources hinders planning and material preparation for teaching sessions.

Furthermore, from their perspective, students' lack of interest in learning science results in decreased focus and preparedness.

" *……murid kelas belakang kurang bersedia untuk belajar. Susah kalau nak bagi aktiviti berkumpulan..murid kurang focus bila ada aktiviti berkumpulan.."* (ST3)

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Students are less prepared to learn and lack focus during group activities.

Analysis of interview data from five students revealed two themes: 1) teaching methods or techniques used by teachers and 2) student needs during teaching and learning.

" *.. Cikgu H**** terang pasal tajuk belajar, cerita sikit-sikit dan bagi latihan kat kami…"* (P1)
She only provides explanations about the topics and then gives us exercises.

" *.. cikgu bagi buat peta minda, cikgu tunjuk nak kena isi apa dalam peta minda, lepas tu cikgu bagi soalan untuk kami jawab…"* (P2)
We need to complete the mind map with the teacher's guidance and then answer the questions given.

" *.. saya suka subjek sains sebab saya boleh buat eksperimen..subjek lain tak buat eksperimen…"*(P4)
I like science for its hands-on experiments, unlike other subjects.

" *.. saya suka kerja berkumpulan.. kawan kawan saya boleh tolong saya kalau saya tak faham…"* (P5)
I like group work; friends assist when I am unsure about a certain topic.

Based on interviews with teachers and students, some constraints, such as time limitations, packed syllabus, and lack of resources, need attention to improve effectiveness. Due to the need to cover the syllabus and some constraints, teachers likely acquire skills to effectively finish planned lessons within the allotted time However, this is without considering creative pedagogy in teaching and learning sessions. Additionally, students rely heavily on one-way teaching, resulting in dependency on the teacher for information, neglecting the emphasis on science process skills. Student responses suggest that group activities, experiments, hands-on learning, and teaching aids can enhance interest and make learning more enjoyable and meaningful. The interview findings align with Holstermann et al., (2010) recommendations that hands-on activities can potentially boost student interest in teaching and learning sessions.

Drawing Analysis

This study identified five levels of concept understanding based on Cardak, (2009b; 2009a) suggestion, a) absence of drawing, b) drawings lacking meaningful representation, c) drawings with misconceptions, d) incomplete drawings, and e) comprehensive drawings. Although similar categories have been used in previous research, these five were discovered effective in classifying student responses in this study by Köse, (2008). Five categories based on Köse, (2008) have been created to classify student responses.

Table 2: Student-Generated Drawing Categorized According To Levels

Level 1:	No drawing. Students replied, "I don't know," or remained silent.
Level 2:	Meaningless drawings with little or no information about pollution causes/effects and conservation concepts. Unlabelled.
Level 3:	Misconception drawings indicate a limited understanding of pollution causes/effects and conservation concepts, along with inaccuracies. Not labeled.

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Level 4:	Incomplete drawings demonstrate a partial understanding of pollution causes/effects and conservation concepts, with some misconceptions and unlabelled aspects..
Level 5:	Comprehensive and accurate drawings depict strong understanding, realism, precision, and clear labeling.

Examples of drawings indicating misunderstanding at levels 3 and 4 are in Figure 1. However, there were no examples for levels 1 and 2 since students did comprehend the concepts of water pollution and water conservation. Analysis reveals high misunderstanding at level 3. The diagram illustrates students' understanding of water pollution levels and conservation concepts, predominantly at levels 3 (92.1%) and 4 (7.9%). No student achieved a complete, accurate, and realistic drawing. Analysis reveals weaknesses in students' understanding, indicating a need for instructional plans to enhance comprehension, particularly in water conservation concepts, addressing issues in teaching and learning sessions.

Figure 1:

Example Of Level 3 Drawing

Example Of Level 4 Drawing

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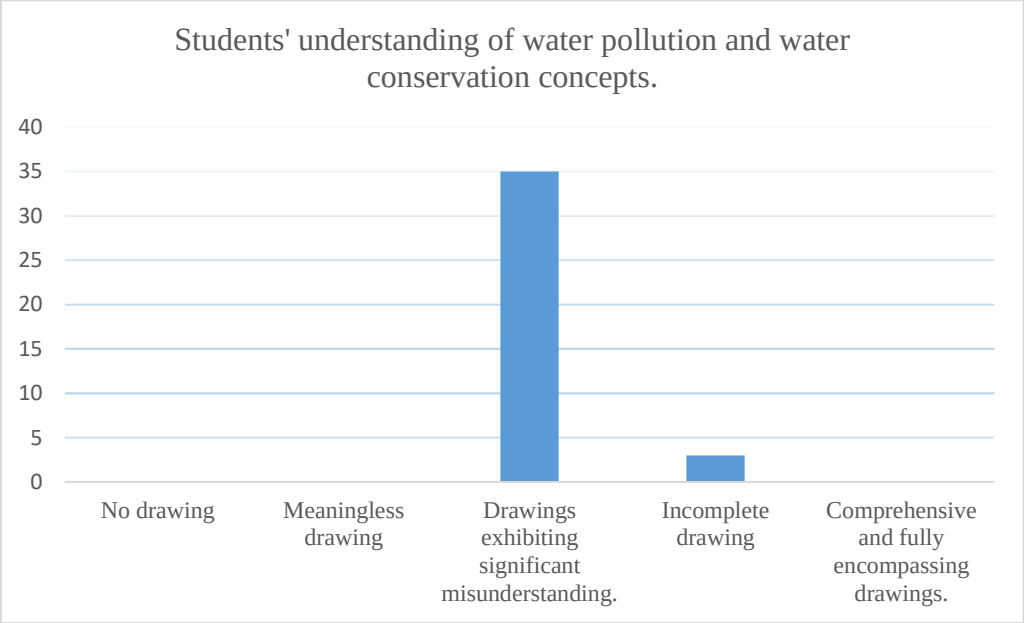
Diagram 1: Level Of Student's Understanding



Conclusion

In this phase, analyzing the needs of students and teachers is crucial for designing effective instructional plans. Research findings indicate that teachers are still predominantly employing teacher-centered teaching methods. These teachers require engaging lesson plans to aid teaching and learning, effectively capturing students' attention during instructional sessions. Interview findings and drawing analysis also reveal that time constraints and activities during teaching and learning sessions play a significant role in ensuring learning content delivery to students. Additionally, there is a misunderstanding among students regarding concepts related to water pollution and conservation. This supports Cardak's finding, which suggests using the drawing method to identify misconceptions or initial understanding for further actions. Therefore, it is hoped that the instructional plan developed using the teaching approach utilizing the 5E Model can assist teachers and students in addressing issues in teaching and learning sessions, thereby enhancing knowledge levels and fostering attitudes and practices towards water conservation activities.

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