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UNHEARD SENTIMENTS OF MAMANWA (INDIGENOUS) LEARNERS IN THE MAINSTREAM EDUCATION: A BASIS FOR EDUCATIONAL POLICY

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Abstract
This article aimed to investigate the unheard sentiments among Mamanwa learners in mainstream education to create a suitable educational policy for indigenous learners in the Philippines. The study utilized purposive (non-probability) sampling comprising fifteen participants residing in Panaon Area, Southern Leyte, Philippines. Since the study involved the indigenous people community, free prior informed consent (FPIC) was secured from authorities. This study focused on the lived experiences of Mamanwa learners, particularly the barriers, challenges, and coping mechanisms for handling the struggles they faced in mainstream education. A face-to-face semi-structured interview was employed to gather meaningful responses analyzed through Colaizzi's strategy. The findings revealed that the Mamanwa learners' social isolation, the inadequacy of learning materials, lack of access to educational services, and limited support resources and educational funds from the government have contributed to their ongoing challenge to completion in mainstream education. These factors have all affected their personal and social well-being. Conclusively, despite the barriers and challenges, however, the Mamanwa learners are becoming resilient and diversely unique individuals who need to be understood, accepted, and embraced just like any other member of society. Furthermore, the fueling mechanisms of every indigenous group to cross mainstream education are in the hopes of building growth, promoting connections through intense exposure in the community, and as individuals of disadvantaged groups with a social change mindset aimed to improve their social status.

Keywords: indigenous people, indigenous peoples' education (IPEd), mainstream education, phenomenological analysis

Introduction

Indigenous communities in the Philippines have a role in developing the country and have been promoting education (Gabriel et al., 2020). The Department of Education (DepEd) has promulgated a program for indigenous people called Indigenous Peoples Education (IPEd) Program. The purpose of this program is to provide an educational initiative undertaken through formal, non-formal, and informal modalities with an emphasis on the critical areas of Indigenous Knowledge Systems (IKS) (Cahapay, 2021). Moreover, the program also focuses on community lifecycle-based curriculum and assessment, educational goals, aspirations, and competencies specific to the Indigenous Cultural Community (ICC), engagement of elders and other community members in the teaching-learning process, assessment, and management of the initiative, recognition and continuing practice of the community's ILS (Napanoy & Peckley, 2020). The IPEd program serves as the response of the DepEd to the Indigenous peoples' (IP) right to basic education (Victor & Yano, 2016). IP's context-responsive education respects indigenous cultures and promotes the importance of indigenous knowledge, skills, and other cultural heritage aspects. In that case, indigenous education aims to restore civilization, strengthen communities and cultures, and develop economic and political skills to effectively manage local indigenous affairs and economies in national and international contexts (Clarke, 2001). The priorities of indigenous education include self-government, community-based projects, and strengthening language, experiences, beliefs, culture, and values (House, 2006; Casinillo et al., 2020). Moreover, the protection of the indigenous language is a way to protect the culture, and values and reinforce the identity of native people in the country.

Indeed, indigenous peoples are entitled to a sufficient and holistic education, and this education must reflect and point out their shared values, beliefs, principles, and general notions, among others (Clarke, 2001). Hall et al. (2015) depicted that education that focuses on the complete being, both cognitively and emotionally, is beneficial to the community. To ensure universal and equitable access of all Indigenous People (IPs) to quality and relevant education services towards functional literacy for all, the DepEd implemented Department Order No. 62, s. 2011 entitled "Adopting the Indigenous Peoples Education Policy Framework". As a culture-responsive education, the pedagogy, content, and assessment of all learning areas integrate Indigenous Knowledge Systems and Practices (IKSPs) and Indigenous Learning System (ILS) of the IPs. Indigenous communities need knowledge and intellectual resources to protect and pursue their interests within the framework of the state as well as the international community. However, the study of Eduardo and Gabriel (2021) showed a limited mechanism to promote awareness among IPs on the framework of DepEd.

In addition, the study by UNESCO (2014) stressed that Indigenous Peoples face numerous barriers to education and are deprived in terms of the growth and transformation of education. Moreover, the fact that official school systems rarely reflect the realities of indigenous lives or traditional educational methods is a crucial flaw in administering IP education. Unfortunately, most of the national curricula overlook indigenous peoples' history, beliefs, customs, and languages; learning materials, textbooks, and other academic resources mirror mainstream society's ideals, traditions, and norms, among others.

The methods for imparting knowledge and enforcing class discipline differ from those used in the pupils' homes or communities. Because they lack cultural training and understanding of indigenous peoples' values and ways of life, most non-indigenous teachers are unprepared to teach in indigenous communities (Napanoy & Peckley, 2020). Wherein the school's orientation and educational goals are not determined by elders or community members (UN, 2008). Thus, this study claims that the Indigenous people faced challenges in completing their education. There were hidden obstacles, numerous barriers, and challenges, as well as unheard sentiments among indigenous students in mainstream education. This study is crafted in a way that there is a need to address this problem experienced by Indigenous People (IP) students. Therefore, this study is conducted, which claims to investigate the unheard sentiments of Mamanwa learners in mainstream secondary education and their coping strategies. And hopefully, help the teachers and school administrators address and cater to the learning difficulties experienced by indigenous students and their educational needs. In this connection, the WCIP (2014) suggested that efforts are necessary to ensure that there is access to education for indigenous peoples that is culturally and linguistically acceptable and that does not target or result in forced assimilation. The formal education system has not discussed this part of the educational needs of indigenous people in the Philippines. Most non-indigenous teachers are not prepared to teach in indigenous communities because they lack cultural training and understanding of their values and ways of life. Elders and community members are not involved in setting the direction or educational goals of the school (UN, 2008; UNESCO, 2014).

It is worth noting that how IP education will effectively be carried out depends on the teachers' and school authorities' competency skills in implementing and managing IP education. De Vera (2017), and Napanoy and Peckley, (2020) portrayed that enhancing teachers' competencies is a must through a series of training to equip them with cultural sensitivity and skills needed to teach the indigenous children. The study of cultures, values, and beliefs of indigenous learners from the Philippine perspective is very scarce in the literature. Indigenous learners' perspective is a good basis for creating an educational policy and improving the existing educational plan for the learners in the country. Hence, this research study is realized and carried out. Therefore, the results of this study will provide baseline information on the quality and accessibility of education, which researchers and academe can utilize for future endeavors in designing and developing a new direction for IP education in the Philippines. This study aims to look for possible means to explore the impact of the distinct barriers and diverse challenges faced by Mamanwa learners, coping strategies, and their unnoticed sentiments in mainstream education. Likewise, this study significantly looked at the effect of the culture of Indigenous People (IP) on education, for this will hopefully help the Mamanwa learners cope with their constant challenge to completion in mainstream education.

Methods

Research design

This research used a descriptive-narrative phenomenological research design, a type of qualitative research that focuses on how people perceive the

world. This qualitative design allowed the researcher to expand the manifestation of Mamanwa learners' unheard sentiments to determine their lived experiences, such as barriers and challenges they faced in mainstream education, and reconstruct their coping mechanisms to improve student learning outcomes.

Research participants and sampling procedure

The study was conducted at three selected Secondary High Schools and one private high school in Pintuyan and San Francisco of the Division of Southern Leyte, Philippines. These districts were chosen because they have more enrolled Mamanwa learners in their respective schools than in other districts. The schools selected were the following: (1) Marayag National High School; (2) Pintuyan National Vocational High School; (3) Saint Joseph College (San Francisco Branch) of San Francisco District; and (4) Alternative Learning System (ALS). The province's ethnicity is generally Bisaya. Some aboriginal people are found locally known as "Kongking" or Mamanwa in the Panaon Area, an island located in the southernmost part of the province, meaning mountain people. The focus participants of this investigation were fifteen Mamanwa learners enrolled in both public and private secondary high schools in the Districts of Pintuyan and San Francisco (Table 1).

Table 1. Distribution of Mamanwa learners (participants)

Schools	**Mamanwa Learners**	
	Frequency	***Percentage (%)***
Marayag National High School	2	13.33
Pintuyan National Vocational High School	2	13.33
Saint Joseph College	5	33.33
Alternative Learning System (ALS)	6	40.00
Total	**15**	**100.00**

This study utilized non-probability sampling, particularly purposive sampling, as the researcher focuses on informant selection. The researchers employed a subjective method in recruiting the target participants. Fifteen participants were recruited in this phenomenological study that fit the suggestion of Iwamoto et al. (2013) as an ample number of participants to generate meaningful themes and valuable interpretations. To strengthen the recruitment of participants, the researchers conducted a preliminary interview that aimed to verify if the selected participants are indeed Mamanwa learners with unheard sentiments. Most of the participants who were enrolled in the ALS-EST program in the San Francisco District and Pintuyan District are from Brgy. Pinamudlan. The participants of this study are the dropped-out Mamanwa learners who failed to complete primary and secondary education. The recruited participants can provide sufficient information about barriers and challenges in mainstream education in the country. Most of them were dominated by women, accounting for ten women, one homosexual man, and four men.

Research instruments

This study utilized an adapted questionnaire from Episcopal Commission on Indigenous Peoples (ECIP) (Eder, 2013) with an interview guide and focus group

discussion (FGD) to measure the validity and content reliability of the data. This tool was employed to gather meaningful responses analyzed using Collaizzi's Method (1978). According to Eder (2013), the said questionnaire was validated by some experts and depicted that it is reliable and associated with students' well-being and resilience in learning. Plus, the said instrument contained open-ended questions and enabled the researchers to unveil the lived experiences among Mamanwa learners. The research questionnaire consists of three parts. Part I of the questionnaire collects information on the profile of the participants. This part includes the participants' highest educational attainment in their family members, year level, age, gender, and academic performance. Part II is the gathered relevant questions of considered barriers and emerging challenges encountered by the Mamanwa Learners in Mainstream Education, which intends to guide the researcher in collecting and coding interview data into categories based on themes, patterns, concepts, or similar features. It consists of 18 open-ended questions in an interview guide that solicit the unheard sentiments and challenges experienced by Mamanwa learners in mainstream secondary education. Part III is the Focus Group Discussion (FGD) with Mamanwa learners and solicits relevant data and emerging issues in the classroom setting with Mamanwa learners in mainstream education. It also consists of 3 probing questions that collect relevant information on the common barriers and sentiments at school experienced by Mamanwa learners in mainstream education. Pilot testing was conducted to test the consistency of the results and the relationships among interviewed data.

Data gathering procedure and ethics

After recruiting the fifteen focus participants, a semi-structured interview was conducted. The face-to-face interviews were carried out one by one, and their responses were recorded using an audio recorder that usually lasted from 15 to 20 minutes. The safety of the participants was the researcher's primary duty since this analysis utilized human subjects. Following a standardized process, the researcher collected data in compliance with minimum health requirements as recommended by the local government unit, which involved obtaining permission to perform the analysis on respondents by giving them a letter of authorization from the School Head, Barangay Chairman, and the Chieftain of the Mamanwa community before interviewing the participants. The adapted questionnaire was employed during the free and convenient time of the participants. They were thoroughly informed about the study's goal and the procedures for both the researcher and the participants. The schedule for the conduct of the study was stipulated in the letter to inform all the concerned authorities regarding when and where the study was conducted and orally recorded agreement to allow me to collect essential data for this investigation.

These selected individuals were informed that it was voluntary and without any pressure to participate in the study, and the study's purpose and procedures were explained to them. They were also oriented and given direction in answering the questionnaire like the demographic data and asked to answer the semi-structured interview with open-ended questions in the adapted questionnaire with utmost honesty, openness, and sincerity and their freedom to withdraw from participation at any time and for any reason in my recruitment letter. After receiving the authorization, the face-to-face interview with the participants

commenced. However, the time allocated was relaxed due to the heavy emotional content of the testimonies, with a large number of conversations lasting up to 20 minutes. The body language, tone of voice, or emotional intensity were recorded in field notes or memoranda, which became part of the study's artifacts and the interview transcripts. Moreover, the verbatim transcriptions of the audio recordings were done after the interview. The verbatim transcriptions were translated into the English language and were peer-reviewed by an English critic. To impose the confirmability aspect of the study, the researcher carried out the process by maintaining accurate written notes and persistently checking and rechecking the data. Moreover, through bracketing with its application in phenomenology, personal biases were minimized to examine the data from a new and different perspective.

Data analysis procedure

The data collected was analyzed using Collaizzi's Method (1978) with detailed steps, as cited by Morrow et al. (2015), which were carried out by organizing the qualitative data collected from the interviews into categories based on themes patterns, concepts, or similar characteristics. Relative to the data analysis used, member checking was employed in the form of focused group discussion. Besides, this analysis was used to verify whether the generated themes emerging concepts, relationships, categories, and structure of the phenomenon captured the respondents' unheard feelings and life experiences that established data credibility. The researchers personally interviewed using a recorder device and transcribes it for coding purposes in the data analysis. Once the coding process was initiated, the researcher had to formulate the coding guide for the transcription and other related relevant purposes. This study was expected to gather a large amount of data. To manage the processing and analyses of these data, the researchers utilized a technique of grouping them into emergent or 29 main themes (Colaizzi, 1978), where 'P' stands for Participant, with the number referring to the specific participant, where 'P1' means Participant #1; 'P2' is Participant #2; and so on. The 'Council of Elders' refers to the collective or collegial body of tribal leaders in the communities. They make up one group for each area identified or labeled as such.

Colaizzi's (1978) seven-stage process ensures a thorough examination, with each phase remaining true to the facts. The ultimate product is a concise yet comprehensive account of the phenomenon under investigation, which has been validated by the people who generated it. The technique relies on detailed first-person accounts of experience, which can be gathered through face-to-face interviews or a variety of alternative means, such as written narratives, blogs, research diaries, and internet interviews. The seven steps in Colaizzi's descriptive phenomenological method are (a) *familiarization* with the data, (b) *identification of significant statements (SS)* that directly relate to the phenomenon under investigation, (c) *formulating meanings* relevant to the phenomenon that arise from a careful consideration of the significant statements, (d) *clustering themes* that are common across all accounts, (e) d*eveloping an exhaustive description* of the phenomenon, incorporating all the themes produced at step 4, (f) *producing the fundamental phenomenon structure*, and (g) *seeking verification of the fundamental* structure that captures all participants lived experiences.

Data triangulation

This study utilized data triangulation through focus group discussion (FGD), interview guide, and validation. To achieve the validity of the questionnaire, the researchers have focused on the opinion that the survey instrument measures what it was designed to accomplish. By combining multiple ways, researchers can overcome weaknesses or intrinsic biases and problems from single-method and single-observer studies. A series of Focus Group Discussions (5 batches) with four randomly recruited participants for each set was conducted to check and verify the researchers' thematic analysis of the data collected from narratives and interviews. Validating and re-validating the researchers' interpretation of the narratives and the responses during the discussion were made intensively. After the FGD process, four out of six formulated themes were finalized.

These themes were now labeled as the unheard sentiments of Mamanwa learners and the barriers and challenges they experienced in mainstream education. The data gathered was presented in tables which served as the basis for the discussion and generated emerging themes. In analyzing the data in Part I, the statistical technique employed was frequency counts which were interpreted statistically. The semi-structured interview data gathered through questionnaires with open-ended questions were analyzed and interpreted from various angles as reflected in the emerging themes. The data collected from Part II and III of the questionnaires were analyzed qualitatively.

Results and Discussion

Barriers and challenges of Mamanwa learners in mainstream education

Their sentiments in different avenues have gone through leaps and bounds as they experienced various challenges and barriers in mainstream education (Table 2). Indigenous learners in nature commonly showcase their ineptness regarding lifestyle, performance in school, and social interaction in the community as members of the marginalized sector on different platforms. As viewed holistically, the barriers and challenges are categorized into six: historical and ongoing assimilation barrier, limited support resources barrier, financial barrier, geographical barrier, social, cultural, and political barrier, and contextual barrier and challenges.

Table 3. Historical and ongoing assimilation as a barrier to completion in mainstream education

Barriers and Challenges	Indicators	Sample Utterances / Verbatim Response	F
Historical and ongoing Assimilation Barrier	Racism	Our classmates were humiliated and mocked, and referred to us as "Kongking,"having an inferior race. [P4] [SS 48]	13
		"As a member of the minority group, I can hardly escape the discriminatory judgments and labeling us an inferior for being a member in a minority group." [P11] [SS 114]	
	Peer Pressure in Classroom	"I was bullied by my classmates and a victim of discrimination in school." [P11] [SS 114]	11

	Victims of Unaddressed Bullying and Mocking Experienced	"My elder siblings recounted to me their experience of being bullied and humiliated by their peers at school, an event that was not appropriately addressed by the school or teacher" [P5] [SS 56]"	5
	Dark Past Experienced	"I thought about it and chose not to enroll in that school because my elder siblings had gone through that horrible experienced." [P7] [SS 75]	5

Under this category of historical and ongoing assimilation barriers, racism is the top-ranked indicator (Table 2). Peer pressure in the classroom is the second barrier, and victims of unaddressed bullying and mocking are experienced as the last indicator. This indicator, however, resulted in the upsurge of overwhelming prejudices, stereotyping, and racism from Non-IP people that exasperated them. Racism and discrimination in schools have long been recognized as significant impediments to creating supportive classroom and school environments. As a result, students are more engaged in their studies and feel more connected to their school (Pachter et al., 2010).

These scenarios show how the Mamanwa learners perceived their battles and struggles in the school setting of mainstream education and portrayal of the as highly disadvantaged sector in the community, and in some angles, impacted them negatively. This manifestation is explained in the Social identity theory, which indicates that group stereotyping and prejudice are more likely when social identities are salient; conversely, downplaying the salience of intergroup differences can mitigate discrimination (Merolla & Jackson, 2019). According to Walton et al., (2020), indigenous students reported that positive relationships with faculty aware of their unique needs and struggles helped their achievements.

Table 3. Limited support of resources as a barrier to completion in mainstream education

Barriers and Challenges	**Indicators**	**Sample Utterances / Verbatim Response**	**F**
	Lack of funding from government/LGU and limited benefits in education for IPs and other resources	I can testify that we seldom received financial assistance from the LGU or other stakeholders as members of the 4Ps, unlike in the other municipality. [P8] [SS 89]	13
		I can attest that we seldom received educational funds from the Government/LGU and we did not receive the same benefits and privileges as enjoyed by the Non-IP students [P12] [SS 125]	
	Lack of Learning and Supplementary Materials	Because of limited learning materials, we tend to borrow and share books with other classmates. [P4] [SS 49]	10
	Denied Indigenous	I can recall that I was humiliated	10

Limited Support of Resources Barrier	Perspective and Dismissal of Indigenous Knowledge	by my Non-IP classmates because of my indigenous knowledge and perspective about mother nature which is way different than theirs. [P6] [SS 70]	
	No Allowances in Boarding House, Clothing, Travel allowance & Lack of Public Transport/Transit	I can claim that we do receive free tuition at Saint Joseph College, a private institution, but only for our matriculation fee because other fees, such as uniforms and additional school fees, are paid by us" [P6] [SS 67]	8
		There was a time when we were unable to get to the highway in time to catch passing buses or other public utility vehicles (PUVs), causing us to miss school." [P7] [SS 76]	
	Child Labor and Refugees	I can remember when we were young back then, we frequently got absent because we were obliged to go to the mountain for mat weaving and rattan weaving, and it was fun. [P1] [SS 9]	6

In this study, among the five indicators above, "lack of funding from local government and limited benefits in education for IPs and other resources" is the topmost indicator under the limited support resources barrier. This finding corroborates the findings of De Vera (2017) about the insufficiency of the resources provided by the government. However, most of the respondents disclosed by an elderly ALS student [P12] that they used to receive financial assistance from the local government of Saint Bernard for 5,000 pesos for each Mamanwa learner. But this had stopped due to the pandemic, so they moved to Pinamudlan because they did not have a stable income in Saint Bernard. Unfortunately, in the Municipality of San Francisco, where the Mamanwa community in Barangay Pinamudlan is located, she unhappily shared that they had not received any financial assistance from the municipality. The majority of Mamanwa students were unhappy and complaining, too. They feel that despite free education to students studying in public schools, the efforts exerted by the government are not enough for them to say that they get better access to free education (Eduardo & Gabriel, 2021).

The second topmost indicators were the lack of learning and supplementary materials, denied indigenous perspective, and dismissed indigenous knowledge. This situation is no longer new in the classroom setting with students of different races. This situation will continue to be part of teachers' challenges because there are currently no supplementary learning and reading materials in the Minamanwa language that indicate their community setting. Teachers and schools also have low standards of indigenous students' abilities and are willing to tolerate their academic failure (Perso, 2020). The methods used to impart instruction and discipline clash with those commonly practiced in the student's homes or communities. Most non-indigenous teachers

are not prepared to teach in indigenous communities because they lack cultural training and understanding of their values and ways of life. Elders and community members are not involved in setting the direction or educational goals of the school (UNESCO, 2014).

In this study, the researchers identified government inaction as a barrier, with community action and creating support systems as related support resources. Government inaction can represent instances of lack of response or neglect by officials and entities. The lack of balanced inclusion of Indigenous worldviews and knowledge systems holds implications for the communities with those knowledge systems and humanity's broader adaptive capacity to cope with environmental and social challenges (Eder, 2013; De Vera, 2017). P1 can remember when they were young back then, and they frequently got absent because they were obliged to go to the mountain for mat weaving and rattan weaving as their primary economic source of living.

When dealing with indigenous students, culturally responsive teaching allows teachers to modify the curriculum and their approaches and strategies. Culturally attentive instructors should develop, conserve, and strengthen IP culture as a basis for learning and growth (Cahapay, 2021). Moreover, respondents also revealed that no allowances in boarding houses, clothing, travel allowance, & lack of public transport/transit are considered barriers to access to education that was taken for granted. P6 can claim that they do receive free tuition at Saint Joseph College, a private institution, but only for their matriculation fee because other fees, such as uniforms and additional school fees, are paid by them. P7, an SJC student also, noted that there was a time when they were unable to get to the highway in time to catch passing buses or other public utility vehicles (PUVs), causing them to miss school. This event, which he shared with his Mamanwa classmates and friends, demonstrates a barrier to education. Access and limited support resources are some of the most significant obstacles to arriving at school on time. Barriers to accessibility can be linked to a variety of challenges (Casinillo, 2022).

Table 4. Finance as a barrier to completion in mainstream education

Barriers and Challenges	**Indicators**	**Sample Utterances / Verbatim Response**	**F**
Financial Barrier	Poverty	Due to our nomadic lifestyle, we felt discriminated against by the Non-IP community because we get visible along with our family and fellow Mamanwas during fiestas to ease our hungry stomachs. [P10] [SS 108]	14
	No permanent income of parents	Our studies are greatly affected because our parents don't have a permanent source of income in the mountain and pastoralism. "[P4] [SS 49]	12
		I believe I have had to work hard, even if there have been times when I have had to miss class due to a lack of "baon," or lunch food"	

	Doing underpaid work	[P4] [SS 45] My siblings would have to work hard in construction, run errands, and do odd jobs just to put food on our table. [P1] [SS 4]	10

In a more specific manner, under the category of financial barrier, based on the responses, poverty is the topmost barrier, followed by no permanent income of parents (Table 4). This finding also corroborates the findings of Jabbar et al. (2019) and Napanoy and Peckley (2020) that poverty is a big problem faced by IP parents and students. This data is supported by the Indigenous Higher Education Advisory Council (2008) study, which revealed that financial hardship remains at the top of the list as the main barrier to Indigenous educational achievement. Financial pressures were a concern for all students, especially true of the Indigenous student population. Indigenous students listed lower socio-economic class as an added stress (De Vera, 2017; Cahapay, 2021). The study of Casinillo (2022) reaffirmed this point by confirming that financial support was essential to success. Being financially unprepared was identified as a barrier. P4 indicated that even though she was working under budgetary restrictions, she still had to get it out alive. Despite the shortage of food and other resources, she has to labor hard. These experiences caused her to become self-directed and focused on reaching her goals, which enabled her to complete her education and support her mother. She shared her determination to go to school despite the various barriers and challenges. In addition, Indigenous children are more likely to arrive at school hungry, sick, and exhausted, they are often bullied, and there is also extensive use of corporal punishment. Their socioeconomic level and minority status make them feel ashamed. Bullying from non-IP students is common, and branding them as underachievers and underprivileged.

Table 5. Geographical condition as a barrier to completion in mainstream education

Barriers and Challenges	**Indicators**	**Sample Utterances / Verbatim Response**	**Fr**
Geographical Condition	Geographic separation and distance from their community to school	Often, we get separated from our parents looking for food, and because of our distance from our community, we had to walk for about 45 minutes to get to school, and we arrived late with my other Mamanwa classmates" [P4] [SS 47]	11
	Absence of farm-to-market road	Because we don't have an access road passable by vehicle, our studies and delivery of our products are somewhat affected. [P3] [SS 39]	10
	Semi-permanent communities	Due to the influence of our chieftain, we tend to transfer from one place to another [P1] [SS7]	9

The geographical barrier has three indicators with which geographic separation and distance from their community to school was the top rank indicator. The absence of a farm-to-the-market road is the second-highest and semi-permanent community as the least indicator of geographical barrier (Table 5). Indigenous students often experienced social isolation due to factors such as geographic separation and cultural differences. P4 testified that they had to walk for about 45 minutes to get to school. Mamanwa students have habitually been late to class because of geographic barriers. Frequently they had frequent experiences such as being judged and underestimated by mainstream students. P7 shared that they missed their courses because they could not get to the highway in time to catch the buses.

Moreover, P6 claimed that they sometimes did not attend their classes because they were scared and ashamed of their teachers. Besides, they are bullied and mocked again by their mainstream classmates. This situation is an evident example of barriers that IP students continuously face while attending mainstream schools. However, the absence of farms to market roads harms the Indigenous people community. According to De Vera (2007), most of the country's Indigenous Peoples rely on traditional agriculture using available upland areas. In this study, the respondents were crafting their products such as mat weaving and rattan art, hunting, and gathering from rugged mountains are their main economic activities. However, because of the absence of farm-to-market roads, their transportation was greatly affected, as mentioned by P3. She emphasized that because they do not have an accessible road passable by vehicle, their travel time to school and their products' delivery are hampered.

Table 6. Social, cultural, and political condition as a barrier to completion in mainstream education

Barriers and Challenges	**Indicators**	**Sample Utterances / Verbatim Response**	**F**
Social, Cultural, and Political Barriers	Minority groups are often excluded from school and community representation	As a member of the minority group, I can hardly escape the discriminatory judgments in school and labelling us as inferior for being a member of the minority group in the community." [P11] [SS 114]	12
	Denied Indigenous Culture	When we were arguing with my Non-IP classmates, I recall insisting that their culture is right and way better than ours. [P2] [SS 20]	10
	Social disadvantages and underserved in accessing governmental services	I recall that we were ignored and experienced stereotyping behavior from the Non-IP community when we tried to access public services from the government [P3] [SS 38]	9

The social, cultural, and political barriers are composed of: minority groups often excluded in school and community representation as the topmost indicator; denied indigenous culture as the second indicator, while social

disadvantages and underserved in accessing governmental services as the last indicator barriers (Table 6). The statement of P14 manifests the existence of political barriers. He claimed that maybe their budget from the national government to Indigenous people was used and exploited by political leaders which is why they do not receive any financial assistance. However, according to one of the Pinamudlan Elementary school teachers I spoke with, the financial aid for Indigenous Peoples was allotted for their travel and allowances during the Indigenous Peoples (IP) day every year (August 9) Regional Summit. De Vera (2007) discussed the lives and status of Indigenous People in the Philippines among the IPs, they are the groups or communities most marginalized and given lesser attention by the government.

Another need to be addressed is the cultural barrier that indigenous parents share: providing culturally adapted and more realistic and vocational-oriented school curricula that consider the community's needs. For indigenous peoples, education should reproduce indigenous cultures and preserve, rather than substitute, indigenous identity. Even in some of the most necessary conditions, physical isolation, school funding, and language are not barriers, and there remain difficulties.

The third indicator denied indigenous culture, can be manifested in school uniforms versus formal dress, which is often controversial in many countries. School authorities need to consider other issues related to cultural traditions (e.g., hunting trips or religious rites).

One way to recognize social barriers is to experience various types of socioeconomic disparities. The manifestation of this concept may be seen in the answers to P3. She said they were bullied at school and subjected to open prejudice, specifically regarding how they identified themselves as "kongking." People who knew them in the neighborhood were involved in the name-calling. Also, they are victims of having to obtain no government services like health care and livelihood assistance (Steffens et al., 2021). At school, peers and other students discriminate against them in many ways.

Table 7. Contextual condition in school setting as a barrier to completion in mainstream education

Barriers and Challenges	Indicators	Sample Utterances / Verbatim Response	Frequency
Contextual Barriers and Challenges	Having an untrained teacher with their language resulted in a barrier and communication gap	I was scolded by our teacher together with my IP classmate for not listening to the discussion, and the teacher was concerned since our medium of communication was the Minamanwa language, or our native language, resulting in a language barrier and gap" [P5] [SS 58]." Our non-IP classmates often mock and bully us because of our Minamanwa language, which is slightly different from theirs. [P6] [SS 70] Because of our language, our teacher and Non-IP classmates would seldom communicate with	13

		us and hardly understand our feelings and sentiments. [P4] [SS 50]	
	Misunderstanding their culture results in the misconception of their Behavior	Our Minamanwa language is different from the Non-IP community resulting in misunderstanding. [P11] [SS 118] Because they lack knowledge about our culture, the Non-IP community could hardly understand our behavior and lifestyle. [P8] [SS 90] Due to our language barrier and communication gap, our behaviors in school are often mislabeled and misinterpreted. [P3] [SS 39]	12
	Decay on Indigenous Knowledge Systems and Practices	I recall being mocked by my Non-IP classmates because of my indigenous knowledge and practices about mother nature and the environment, which are different from theirs. [P6] [SS 70]	10

Among the contextual barriers exhibited from the interview, the indicator "having an untrained teacher with their language resulted to the barrier to communication and gap" is the topmost barrier; "misunderstanding of their culture resulting to misconception from their behavior" is the second-highest indicator; and the indicator "decay on Indigenous Knowledge Systems and Practices" as the least indicator (Table 7). Based on the responses from the interview, a significant experience in the classroom setting in mainstream education was shared and uncovered by P5, a Mamanwa student at Saint Joseph College. She recalled being scolded by her teacher for not listening to the discussion. The teacher was concerned since their communication medium was the Minamanwa language, or their native language, resulting in a language barrier and coercion. The situation was skewed because the Mamanwa can comprehend and speak Cebuano or Bisayan, but the teacher cannot understand and speak their Minamanwa language. Teachers often lack knowledge of Indigenous languages and customs, resulting in misinterpretation of students' behavior, learning behavior, learning abilities, and students' needs (Eder, 2013; Napanoy & Peckley, 2020). According to Cahapay (2021), education is a critical arena where indigenous peoples can reclaim and revalue their language and customs. Some even claimed that they have trouble writing, reading, and comprehending what is written in books or materials provided by the school, as evident in the existence of language and communication barriers. They were sometimes influenced by their peers or friends, causing them to drop out of class or school.

The coping mechanism of Mamanwa learners in mainstream education

Mamanwa learners positively cope with academic and personal anxiety through different coping strategies. Thus, parents need to nurture their children in a supportive home environment. When students are in their second home,

teachers must continuously provide a conducive learning environment to improve academic achievement. According to Valenzona et al. (2022), educational coping strategies were also designed to help undergraduate students cope with their lives, including physical well-being, emotional, spiritual, and psychological well-being.

Table 8. Mamanwa learners coping mechanism amidst the barriers and challenges in mainstream education

Coping Strategies	Behavioral Indicators	Sample Utterances / Verbatim Response	Code
Positive disposition to finish the study in Mainstream Education	Intrinsic motivation despite barriers and challenges in school.	"I was once humiliated and mocked by our classmates who referred to me as "Kongking. We just laughed hard and ignored them and rediscovered that what is more important in life is finishing our studies and achieving something in the future, so that they would no longer bully us, and learning to live with the fact that we were born with this race and there was nothing wrong with accepting it."	[P4] [SS 48]
		"Bisan pag bugal-bugalan me ug tawgon mig "kongking" mukatawa nalang me ug amo ra silang baliwalaon kai ang mas importante nga maka human mis pag skwela ug makab-ot namo ang among mga pangandoy para dili nami maliiton ug madawat nami nila" "I truly wanted to finish my studies on time without dropping out, so I told and asserted to my mother that I wanted to enroll in Pintuyan because I had made friends there during my elementary school years, rather than adjusting to a new environment in Catmon, Saint Bernard, which would only add to my stress at school, regardless of our chieftain's influence"	[P1]
		"Gusto gajud ko nga muhuman ug eskwela nga	[SS 10]

		dili ko mag undang-undang, maong me ingun ko sa ahung mama nga gusto gajud kog anhi sa Pintuyan mo pa-enroll kai naa nkoi mga amigo tungod kai dinhe ko nahuman sa Elementary, unja dili npod ko ganahan mag adjust sa bag-ong skwelahan sama sa Catmon"	
Confrontive coping against bullying behavior in school	Breaking the behavioral stigma in school through positive reframing against bullying behavior of classmates	"Anytime our classmates began harassing and humiliating us at school, we simply had to go to the guidance office and report it to our guidance counselor for proper management of my classmates' misbehavior and misconduct" "*Pag naay classmate nga mo-bully namo, mo adto rami sa guidance office ug among itug-an sa among guidance counselor para mahatagan ug aksyon ug sa pag disiplina nila, arun dili nami bullyhon*"	[P3] [SS 37]
Positive mentoring through educating the community and learning to value education	Positive behavior negates societal labeling through a sense of purpose and direction in life through education.	I really wanted to pursue my studies because I want to break the cycle of illiteracy in our family and to influence the whole Mamanwa community on the importance of education" "*Gusto gajud ko makahuman sa akong pag skwela, kai arun makatabang ko pag hinay-hinay pagtambag ug pagmatoto unsa ka importante ang pag skwela para mawagtang ang pagka wlai grado ug maka impluwensiya sa among komunidad"*	[P13] [SS 131]
Resiliency despite discrimination experienced in school and marginalization in the community	Learning to live with the situation through active coping and positive goals as being marginalized in the community.	"Because we want to be accepted and to be part of the larger community, so we thrive and build connection and enroll in mainstream education despite the discrimination"	[P6] [SS 69]

		" *Gusto man gajud namo nga madawat me isip usa ka tawo nga kalakip niining komunidad, maong naningkamot me nga makig-halubilo ug ne skuyla sa mainstream education bisan pa sa mga diskriminasyon."* "Being a good inspiration to others together with strong parental support and having friends who also share the same objectives pushes me to work hard to finish my studies, for I am in Senior High school now"	[P13] [SS 139]
Positive modeling that is worth emulating by other IPs to recompense the support of family and community	Manifested by the robust support system from family, friends, and significant others to withstand adversities in school and community.	*"Sa akong pag paningkamot sa pag skuyla ako nahimong modelo ug inspirasyon sa akong mga kalumad nga Mamanwa ug tungud usab sa suporta sa akong pamilya ug mga higala, ako krun naa sa Grade 11 na sa among tulunghaan"*	

Table 8 shows the current investigation of how Mamanwa learners cope by providing diverse coping strategies and support that influenced the Indigenous students in mainstream education reflects a very rewarding realization. Coping mechanisms were exhibited by these individuals, which empowered them in preserving their identity as an Indigenous people and characterization as Mamanwa people amidst negative experiences and remarks from others. Their coping strategies recompensated the barriers and challenges they experienced in mainstream education: a *positive disposition in life to finish their study in mainstream education*. Obstacles and difficulties in school become insignificant when your inner desire drives you. Despite the humiliation and mockery, she received from the non-IP, P4 found something positive in it. Education is a need in life, she understood. To avoid being ridiculed or humiliated due to their ethnicity, education may be a solution. In addition, this coping strategy is evident in self-controlling, like making efforts to regulate feelings and actions. This experience is shared by P1, where she insisted and asserted to her mother to finish her studies. Regardless of their chieftain's influence, she studied in Pintuyan because she had made friends there and established a good relationship. In return, their self-perceived development and the validation they receive from people they interact with concerning attaining their ideal social interaction and approval enhance their confidence and improve their self-esteem. As they positively build up a better image of themselves. From the perspective of social identity theory (SIT), individual reactions warrant a personal mobility mindset in which society's hierarchical ties are valid and stable but permeable, from the perspective of social identity theory (SIT). As a result, individuals of disadvantaged groups with a

social change mindset try to improve their group's position through collective action, whether they do so alone or with the help of other in-group members (Steffens et al., 2021).

The second coping strategy is *confronting and coping against bullying behavior in school*. It is a reward to reframe bullying behavior in a positive light, according to P3. Instead, students would go to the guidance office if one of their classmates began harassing and humiliating them at school to deal with them appropriately. This action is the only way they'll be able to cope with all of the abuse. This individual employed the distancing managing strategy and let the formal school authority handle their misbehavior. This coping strategy embodies the Relational Cultural Theory. The theory analyzes the impact of disconnection, acknowledging that it is an unavoidable element of being in a relationship, in addition to addressing the benefits of growth-fostering relationships, i.e., connection (caused by empathic failures, relational violations, injuries, etc.). Experiences of disconnection can lead to a strengthened relationship and an increased sense of relational competence (Lertora et al., 2020).

Another coping strategy is positive mentoring through educating the community and learning to value education. A behavioral indicator emphasizes the importance of "positive behavior to negate societal labeling through a sense of purpose and direction in life through education." This coping strategy is a concrete manifestation of the central tenet of Relational-Cultural Theory (RCT) which states that people develop through and toward relationships, which occur within and are influenced by a cultural context. Above all, RCT asserts that people need to be connected to change, open up, shift, transform, heal, and grow.

The result shows that the participants believe that education is beneficial to IP students who are studying and intends to learn or continue their education (out-of-school youth). The students can read and write and mingle with other students and teachers, boosting their intellectual abilities and emotional behavior. Teachers must consider the speed of learning of the students (Eduardo & Gabriel, 2021). The eminent nature of Mamanwa learners in molding and building up their status in the community by establishing a connection and utilizing it in the process of reconstructing their natural form and cultural perspectives and transforming it to their ideal societal inclusion in the community is more than just the act of attending to school in mainstream education as they experienced barriers and challenges.

The fourth coping strategy is *resiliency despite discrimination experienced in school and marginalization in the community* with a strong emphasis on its behavioral indicator, "learning to live with the situation through active coping and positive goals as being marginalized in the community." However, discrimination against their race is one of the struggles they encountered. P11 shared that they thrive on blending in with the dominant culture of the non-IP community despite being bullied and discriminated against. This discrimination from school and lack of parental support significantly affect her studies. In addition, she added that as a member of a minority group, she can hardly escape discriminatory judgments and label them as inferior for being a minority group. P6 also shared her sentiments that they wanted to be accepted and part of the larger community, so they thrived, built connections, and enrolled. This situation holds the idea of social constructionism that humans learn about the world in a social environment. Much

of what we experience as reality is based on shared beliefs. Social constructionists think that things that are commonly perceived as natural in society, such as gender, race, class, and disability, are socially built and hence do not accurately reflect reality.

Indigenous students and their parents also have to face deep-rooted discrimination and racism, rendering the school atmosphere unfriendly and awkward, despite increasing recognition and efforts by governments and civil society. School kids often frequently have to contend with violence from school administrators and other students; modern communities also do not know Aboriginal peoples' beliefs, cultures, and histories. However, building resilience and inner determination factored into program completion (Walton et al., 2020; Casinillo, 2022). Several strategies increased the strength of Indigenous students. Strengthening hope through mentorship and instructor support increased potential success. Having access to education is crucial for the indigenous people who are considered a minority in society. These people feel that they are less privileged and are given lesser attention by both the government and society. They think that what is currently being provided is not enough for the benefit of their children in school.

But resilience, or the ability of students to move forward when schooling was difficult, tedious, or other factors interfered, significantly influenced student success (Casinillo, 2022). This intrinsic factor allowed students to continue despite setbacks. Indigenous students showed lower motivation when the class content was viewed as not immediately relevant to their lives or careers (Cahapay, 2021). Furthermore, the definition of success was not the same for many Indigenous students as it was for non-Indigenous students (De Vera, 2017). This scenario and the relationship to resilience warrant further examination. The last coping strategy is *positive modeling that is worth emulating by other IPs to recompense family and community support* with a behavioral indicator, "manifested by the strong support system from family, friends and significant others to withstand adversities in school and community." According to Jabbar et al. (2019), community and family support are essential influencers. This support was often lacking for various reasons; however, its importance cannot be underestimated for Indigenous students.

Conclusion

The Mamanwa learners' social isolation, the inadequacy of learning materials, lack of access to educational services, limited support resources, and educational funds from the government have contributed to their constant challenge to completion in mainstream education. Despite the barriers and challenges, however, the Mamanwa learners are becoming resilient and diversely unique individuals who need to be understood, accepted, and embraced just like any other member of society. To address the numerous barriers and challenges Mamanwa learners face, the government might build a formal school for Indigenous Peoples (IP) and establish an accreditation program for other IP schools in the Panaon Area. Valuing the significance, it brings to each Mamanwa learner and assisting in the establishment is a greater manifestation to improve Indigenous students' learning outcomes. For future research, one may investigate the sentiments and perceptions after being used and exploited as victims of false

hope and promises from various researchers and scholars in different fields. In addition, research into gender perceptions, orientations, and sexuality of the Mamanwa community might provide an interesting study and comparison of the community's perception of gender sexuality of IP and non-IP students on a larger scale.

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THE INFLUENCE OF DISTINCT TYPES OF MEDIA INTERACTION AND GENDER ON THE PRODUCTIVITY OF UNIVERSITY STUDENTS AS MEASURED BY THE NUMBER OF MEANINGFUL WORDS

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Abstract
This analysis seeks to discover how the richness of meaningful words is affected by the diversity of media and gender. The two separated forms of media in computer-mediated communication, which are real names (CMR) and anonym (CMA), are connected to the production of meaningful interaction in problem-solving exchanges among pupils. Furthermore, computer-based communication has added a layer of invisibility which has caused an increase in daring word usage in conversations using computers. To assess this issue, the research will look into criminal puzzles discussed in clubs, to determine if there is any impact from the various types of media and gender variation. The research used empirical analysis methods to review the effect of different media and sex on the number of meaningful words produced by 30 participants, 20 female and 10 male. Through analysis of conversations in the conversation room, a two-way ANOVA test was administered to figure out the impact of media and gender on the number of meaningful words. The investigation presented that there was no meaningful impact of media diversity and gender on the number of words produced by students in the investigation. The data suggested that any changes in media or gender had no notable effect on productivity.

Keywords: computer-mediated, gender variation, media diversity

Introduction

Information technology has entered human life and is used by humans in various fields of life. Gender inequality in digital media is not the same as direct interaction because in virtual communication there is no physical presence, but people use language as a sign or code for a particular meaning (Pohl & Michaelson, 2005). In a survey conducted by Cubukcu (2012), a new type in the revitalization of information technology is computer-mediated communication (CMC) which results in human behaviour and perception in various ways. One important question that arises is the effects of this alternative form of a communication system on speaking styles and the substance of communication (Adrianson & Hjlemquist, 1991). Suler (2004) said there are six online disinhibition effects in communicating via computers, namely: disconnection anonymity, imperceptibility, non-

simultaneity, self-referential projection, disintegrated creativity, and limiting of influence.

Research shows that in reaching joint consensus in group discussions, CMC groups are more time-consuming than FTF groups, whereas in the emergence of new ideas, there is no difference between the two groups as well as the quality of the decisions produced there is no difference between the two (Olaniran, 1994) CMC also supports people to come into contact with anonymous discussions because CMC offers anonymity in it so that it has the potential to increase group polarization (Connolly et al, 1990). This is due to the limitation of social cues. Anonymity often also supports uncontrolled performance (Jessup et al, 1990) and raises captivating debates during group discussions (Connolly et al, 1990).

The question being investigated is whether the use of different types of media communication (CMR and CMA) and gender have an impact on the productivity of university students in conditions of the number of meaningful statements produced in the course of problem-solving discussions. This research is useful in contributing to scientific knowledge associated with distinctions in communication media and sexual differentiation in communicating and solving problems in group discussions.

Studies have found that in male-dominated computer-mediated communication, men direct to share more and longer notes than women in coed conversations (Herring, 1993; McConnell, 1997; Ross, 1996; Vanfossen, 1996) Research has found that female students who use computer-based collaborative learning are more free to behave if they are grouped into groups of all women than if women are placed in mixed groups while men work equally well when placed in homogeneous or mixed groups (Ding et al, 2011) Studies have shown that in collaborative games, all-female groups tend to work more efficiently than all-male groups. This is believed to be because women are better at collaborative learning tasks as they rely more on their verbal abilities and ask more questions (Prinsen et al., 2009). Additionally, research on sex differences in CMC has found that men are inclined to dominate discussions and send more notifications, while women are more cooperative and inclined to reach an agreement (Sun, 2008).

Research examining the connection between computer-mediated communication (CMC) and gender differences found that men tend to control CMC meetings, posting more announcements (Carr et al., 2004) whereas women are more cooperative and inclined to reach a compromise (Sun, 2008). Other research says that gender differences affect computer-based collaborative work where the difference lies in communication strategies, visual feedback and when misunderstandings occur (Kolouri et al., 2017). Women go to apply conservative strategies while men be likely to employ exploratory behavior. This results in women tending to adjust to existing consensus than men who tend to find new solutions or solutions. Various evidence says that men tend to be more enthusiastic when compared to women in playing games on computers (Gorriz & Medina, 2002) and men tend to speak directly and show their strength and influence others (Archer, 1992; MaCcoby, 1998).

This study found amplification in the amount of contributions in internet-based learning (Secreto, 2013). This indicates that there is an increase in participation in online-based communication. While research in groups uses computer media to its low status in the group (Weisband, Schneider & Connoly,

1995). And also nothing happens in group use by using computer media anonymously.

Sex differences in computer communication used to enjoy or use computers at all levels of education (Colley, Gale, & Harris, 1994). Keywords to say that women have more experience and knowledge about computers. Pay for women using computers and negative behaviour with computers (Stowers, 1995). This can result in perceptions of computers in communicating and using computer media. Women also feel she is uncomfortable if she is in an environment where she feels a minority (Stowers, 1995). Therefore, women will be easier to communicate if they do not know how many women are in the group.

The increasing use of CMC assumes that the CMC reduces gender-caused communication as arises in direct communication through minimizing physical movements and social cues that reflect gender verses (Wojahn, 1994).

Literature review

In social psychology, communication is an important thing as social psychology is a study or study of the ways in which a person is affiliated or infected by others (Krauss, 2002). Social psychology is more about interpersonal communication. Actions taken are actions that carry messages or information between or send messages and goals or recipients of the message (Krauss, 2002). Communication systems always have two kinds of signals, namely signs and symbols (Krauss, 2002 Four communication paradigms include functions used as information used for messaging (Krauss & Fussel, 1996). These four models are Sender-Receiver Model, Intensionalist Patterns, Empathize Paradigm and Dialogical Paradigm).

According to Bailenson and Yee (2008), there are three different types of means of communication which are in-person human-to-human interaction, digital interactive communication, and conversation through public communication. Communication theory says that communication is a kind of meaning to knowing how they can communicate with them that can expand or distance from others and from society that is done next (Littlejohn & Foss, 2008).

Several study studies show that the experience of males and females in online environments is distinct, especially in several ways, for example, appearance, motivation, perception, learning practices and interaction behaviour (Chyung, 2007; Gun et al., 2003, Price, 2006; Rovai & Baker, 2005; Sullivan, 2001; Tapin & Jegede, 2001). Sullivan (2001) discovered notable disparities between male and female pupils in determining the advantages and disadvantages of a virtual environment that necessitates adaptability and limited face-to-face interaction. According to Merchant (2012), the biggest difference between men and women in terms of communication is the perception they have regarding the aim of discussion or communication. Psychological observations on sex distinctions in academia highlight that females lean to employ interaction as a means to build social cohesions and affiliations, whereas males utilize conversation as a tool to assert their power and dominance and obtain tangible results (Maltz & Borker, 1982; Wood, 1996; Mason, 1994).

It has been suggested that females are generally more emotional and friendly in their dialogue style, while males be likely more assertive and power-hungry

(Barrow & Rubenfield, 2003). However, these are general tendencies and may not apply to all individuals.

Women also incline to be more friendly in their conversations, while men tend to emphasize their autonomy (Eagly, 1987; Grilligan, 1982). This difference in social orientation can also affect the way that women and men communicate, and can impact the effectiveness and productivity of communication in various contexts. Women also tend to prioritize cooperation and are oriented towards mutual interests, selflessness and desire to join together to be one with the other (Mason, 1994). For women, the act of communication is often seen as a meaningful process in and of itself (Chodorow, 1989; Hartmann, 1991; Statham, 1987; Surrey, 1983). Research has also shown that females be disposed to interrupt conversations more often than men, which is thought to be due to their lower awareness of their status in comparison to men (Thorne & Henley, 1975). Research also found that the high and low status in a group is assumed to be more competent and receive many opportunities to make contributions in groups and men tend to be seen as higher in status than women (Berger, Rosenholtz, & Zelditch, 1980).

Males and females apply distinct approaches to control other members of the group, and instructing subjects in influencing other members further increases gender differences in the style of interaction (Carli, 1989). Research also shows that participants in communicating using computer media choose the information that is relevant to them rather than those that are not relevant (Oeberst & Moskaliuk, 2016). The influence of gender differences in confidence in using computers also varies. Cassidy and Eachus (2002) initiate that males have greater competence in computing than females. But Anderman and Young (1994) found no effect of gender differences on self-efficacy in using computers. Other studies say that men spend more time playing games, social lessons, programming and things that are not useful, while women are more interested in things related to mathematics, English, and reading (Demetrulias, 1985)

One theory that talks about media is the Media Richness Theory (Daft & Lengel, 1986) which says that media is distinguished based on the ability of each media in managing information or the ability to reduce uncertainty and unclear information. Media characteristics determine the wealth of information that is processed. Media that has a high level of information richness is thought to be better suited for complex tasks, as it offers a wider range of communication options that support the completion of multiple tasks effectively (Allmendinger, 2010). CMC is also used within the organization in developing persuasive communication that aims to achieve progress in speed, cost and accuracy (Wilson & Lu, 2008). Computer-mediated communication affects the operation of computer networks to exchange data by assigning, keeping, and bringing back it (Berge & Collins, 1995). Research shows that the number of changes in opinion in person-to-person communication is significantly higher compared to changes in opinion in computer-based communication (CMC) (Blasio & Milani, 2008). The four unique contextual factors that exist in computer-based communication (CMC) that affect processes in groups are anonymity, isolation, identification and presence (George & Sleeth, 2000).

Suler said there were six effects of release behaviour in online communication or known as the online disinhibition effect. According to Suler (2004), there are six effects of anonymity in online communication: disconnection anonymity,

imperceptibility, non-simultaneity, self-referential projection, disintegrated creativity, and limiting of influence. These effects can shape online behaviour and the dynamics of online interactions. Anonymity which is also referred to as an identity that is hidden from group/group members can lead to group homogeneity, increased participation, and increased expression of identity either alone or socially (Spears & Lea, 1992). Anonymity also supports an environment that can increase more objective participation and communication and more honest ideas and evaluations and increase group productivity and group decision-making processes (Pinnsonneault & Heppel, 1997). Additionally, previous research has shown that anonymity in group communication can increase criticism, but it does not have an effect on disinhibition and therefore does not impact group performance (George, J.F.; Easton, G.K.; Nunamaker Jr., J.F. & Northcraft, G.B., 1990).

Method

Dependent variable (Y): Productivity the number of meaningful words, independent variables (X1): Variety of Media namely Computer-Mediated Communication with Anonym (CMA) and Computer-Mediated Communication with Real name (CMR). Independent variable (X2): Gender differences. The study participants were 30 university students of Gadjah Mada University Yogyakarta who volunteered in an experimental study with the title "Group Processes in solving two problems: Face to Face and computer-mediated communication". This study replicates the research conducted by Lillemor Adrianson and Erland Hjelmquist. Data Collection Tool: Data for Gender Differences, Data for the productivity of meaningful words.

The study uses a pre-and post-test experimental design to control for the independent variables of media variability and gender differences, intending to determine any differences in the productivity of university students in the name of the number of meaningful notes produced. The inquiry itself took data from an experimental study that replicated Adrianson's and Hjelmquist's research with the title "Group Processes in solving two problems: Face-to-face and computer-mediated communication. This study employs a two-way ANOVA analysis to determine the effect of media variability and gender differences, as independent variables, on the productivity of university students measured by the number of meaningful words produced, which is the dependent variable.

Findings and Discussion

The two-way ANOVA analysis method is used to determine the impact of assorted media on the productivity of academy students, as measured by the number of meaningful words produced in discussions using different media. The media used is computer-based communication with names or anonymous (CMR and CMA).

For female participants who used CMA media the mean value was 358.60 with a standard deviation of 134.54 with the number of participants 10. While female participants used CMR media with a mean value of 534.70 with a standard deviation of 193.65 with the number of participants 10. The mean for participants men who used CMA media were 535.40 with a standard deviation of 163.44 with the number of participants 5. While male participants who used CMR media had a

mean of 708.60 with a standard deviation of 299.53 with the number of participants 5.

The total mean for the CMA group was 417.53 with a standard deviation of 163.44. The total mean for the CMR group was 592.66 with a standard deviation of 238.62. The overall score for female participants was 446.65 with a standard deviation of 185.74 with a total of 20 participants and for male participants with a mean of 622.00 with a standard deviation amounting to 245.11 with a total of 10 participants. The total mean is 505.10 with a standard deviation of 219.81.

It is known that the F value is 2.933 with a significance value (probability) of 0.052. Because the probability value is greater than 0.05, the null hypothesis is obtained and the alternative hypothesis is dismissed which means that the dependent variable variant is the same or homogeneous so that it meets the requirements for variant analysis.

From the analysis, the F ratio for the media variance factor is 5,472. When compared with the F table with a significance level of 0.05 (5%) where dk 1 (numerator) and 26 (denominator) obtained a number = 4.22 and a significance level of 0.01 (1%) = 7.72, then looks F ratio is greater than F table (0.05) then the second hypothesis is obtained that there is the influence of the variety of media on the productivity of the sum of meaningful arguments formed in the discourse. F ratio values for gender or gender differences were found at 5,616. When compared with the F table with a significance level of 0.05 (5%) where dk 1 (numerator) and 24 (denominator) obtained several 4.22 and a significance level of 0.01 (1%) = 7.72 looks more F ratio big compared to F table (0.05) then the alternative hypothesis is admitted, suggesting that gender has an impact on the productivity of academy students in terms of the number of meaningful words produced during discussions. So it can be said that gender differences affect the productivity of the number of meaningful arguments formed in the discourse using various CMA and CMR media. Whereas the F ratio for the variety of media interacting with gender is 0.00.

When compared with the F table with a significance level of 0.05 (5%) where dk 1 (numerator) and 24 (denominator) obtained several 4.22 and a significance level of 0.01 (1%) = 7.72 looks more F ratio small compared to F table (0.05) therefore, related to the conclusions of this study, the null hypothesis accepted, indicating that there is no significant influence of the use of different media or gender differences on the productivity of university students in name of the sum of meaningful notes formed through conversations when the two variables are considered together.

This means that both the use of different types of media and gender differences can have an impact on the productivity of university students in the name of the sum of essential arguments produced through conversations. However, when the two variables are combined and considered together, the conclusion of this investigation shows that neither the variety of media nor sex differences have a significant impact on productivity.

Researchers also realize that there are risks to internal validity that are common in preliminary analysis. Factors that influence validity are History, Maturity, Selection, Test procedures, instruments, mortality and regression toward the average value. The factors above are controlled as much as possible so that the experiment is done well and validity can be achieved. Some things that threaten internal validity and are difficult to control are selection questions. Participants in

groups are often dominated by women because there are more women volunteers than men.

Besides that, some participants cancelled the experiment due to illness or without notice, so this disrupted the course of the experiment. Men tend to commit to thematic conversations and they tend to be happy to dominate the discussion by sending many opinions (Sierpe, 2001). Researchers say that domination in discussions in discussion groups using computer media is often dominated by men (Moldafsky & Kwon, 1994). Those who can type quickly feel more able to express themselves, and those who feel uncomfortable by being part of an online group find it difficult to express socio-emotional feelings online and also differences in traditions or customs also emulate in the application of CMC such as trust in other members in groups (Hiltz & Johnson, 1990).

The number of word productivity is related to the emergence of ideas in each individual. The emergence of ideas is a cognitive and communal mechanism (Denis et al, 1999). The production of these rules is activated and naturally by stimulation, and external awareness authority (Anderson, 1992). Idea production depends on the strength and not the production of rules on the individual. One theory that explains human action is the Theory of Reasoned Action (Ajzen and Fishbein, 1980), which posits that a human's action is ruled by their attitudes towards the behaviour. Following the scheme, the more favourable a personal attitude is towards a special action, the more likely they are to employ that behaviour. In Korea for example, male and female students apply computers as a device to build social networks and also form knowledge independently (Lim & Meier, 2011).

Conclusion

Fixed the conclusion of the investigation, found the use of different types of media did not have a significant impact on the productivity of university students in the name of the sum of meaningful words produced through discussions. Additionally, when gender differences were included as independent variables, found no substantial distinction between the two, and gender did not affect the productivity of the number of meaningful words produced when using different media. Therefore, it can be concluded the conclusion of this research indicates the application of different types of media does not have a significant impact on the productivity of university students in the name of the sum of meaningful arguments formed through problem-solving discussions. Furthermore, gender differences do not come to emulate the effectiveness of various media used by students in producing meaningful words.

Some things that can be done for the next research are as follows: Experiments are carried out more rigorously so that extraneous variables can be more controlled by researchers. Topics chosen in the discussion can be chosen topics that are not too heavy or difficult, for example on issues that are happening around participants so that participants have more data and insight into the issues being discussed. The timing should be adjusted and recommended in the morning so that participants 'fitness levels are assumed to be the same because the issues discussed in the Criminal Puzzle case are enough to drain participants' minds.

The room setting for the experiment is made as good as possible so that each participant cannot communicate with each other other than with a computer or see each other so that the experiment gets better. The discussion process can be

extended again because the idea-creation process of each individual is different so it is expected that more word productivity will emerge.

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TEACHERS' PERSPECTIVE ON USING MULTIMEDIA TECHNOLOGY FOR TEACHING ENGLISH

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Abstract
The rapid development of information and communication technology in this recent times has influenced the way the English language should be taught. This study aims to find out the use of multimedia as a technological device in English learning from the perspective of the teacher. This study involved 2 participants: the two 12th-grade English teachers of SMAN 2 Semarang. This study applied a qualitative approach with a phenomenological approach. Data werecollected through observation and in-depth interviews based on three categories; kinds of multimedia, advantages, and disadvantages, and how the teacher uses the media. A thematic analysis design is used in this study. This started at the data collecting phase and lasts through the transcription, reading and re-reading, analysis, and interpretation stages of the data. It is concluded that the teachers have a positive perspective toward using multimedia technology in the classroom to teach English. The use of multimedia technology has had a major impact on the advancement of education, especially English learning.

Keywords: multimedia technology, teachers' perspective, teaching English

Introduction
Learners understand that lifelong learning became their norm. The idea of learning English was a ticket for advanced jobs or international students. Nowadays, English knowledge had become one of many skills that can help individuals obtain meaningful employment opportunities and obtain better job or career development. As English teachers in the 21st century, it was more important than ever for us to learn to use multimedia technology in the classroom, model its extensive use, and seek relevant and purposeful teaching strategies to attract learners and learn to the maximum (Fatimah & Santiana, 2017).

The implementation of Indonesia's advanced multimedia technology in education was still at an early stage and had not been fully utilized. According to the Ministry of Finance Republic of Indonesia (2020), the obstacles and problems in the application of multimedia technology in the education field were due to: underdeveloped infrastructure in Indonesia, the application of these technologies in Indonesian schools; and insufficient human resource preparation. The

implementation also supports multimedia application school technology. Therefore, in the process of teaching English to the learners, it was very important to apply multimedia technology to education in Indonesia so that they would not be left behind by students from other countries.

Multimedia was very important for teachers to help students understand English as a foreign language. Even teachers could use a variety of multimedia in the process of English teaching and learning, especially in the process of teaching English to learners. According to Kemala (2016), creating an enjoyable context in teaching English to learners was essential for teachers to maintain the student's attention. It meant the role of the teacher was very important in motivating the students' interest in the English teaching-learning process and also in maintaining the relationship between the teacher and students.

Therefore, multimedia technology was the best solution to the problems mentioned above. Because it had also been proven in math and science learning. According to Gartika et al. (2019), the use of multimedia in the mathematics learning process has caught the interest of both students and teachers. Using multimedia in science learning could assist students in solving difficulties and improving their comprehension of subjects (Sukariasih et al., 2019). From the teacher's viewpoint, this paper explored the use of multimedia as a technical instrument in English learning. Audio multimedia, visual multimedia, audio-visual multimedia, and the teacher as a model are all examples of multimedia that a teacher could use while teaching English (Rahmi, 2014). Those kinds of multimedia could make the learning activities more enjoyable as mentioned by Kemala (2016), providing an enjoyable background in teaching English to the learners was necessary for teachers to retain the students' attention.

The use of multimedia technology in teaching English

Multimedia technology was seen as important in educational institutions to keep education relevant in the twenty-first century (Selwyn & Gorard, 2003). The use of multimedia mentioned here involves the use of a Laptop or Computer, Smart Application Creator (SAC), Canva, Microsoft Teams, Padlet, Quizizz, Kahoot, Internet, LCD Projector, and Powerpoint. The multimedia teaching device would completely activate the students' audio-visual and other sensory organs, resulting in the best cognitive impact possible (Zhen, 2016). One of the ultimate aims of multimedia language teaching was to enhance students' enthusiasm and interest in learning, which can be a valuable way to engage them in language learning (Sagar, 2017). The multimedia teaching device would completely activate the students' audio-visual and other sensory organs, resulting in the best cognitive impact possible.

As a result, multimedia teaching was crucial, especially in English lessons; only successful multimedia coordination could better complete the teaching mission. Teachers should do everything possible to titillate students' interest in a feel comfortable point and encourage them to engage in class with a deep sense of excitement and enthusiasm.

Multimedia technology in teaching English

According to Munir (2020), multimedia technology is a blend of computer technology both hardware and software with electronic technology. A range of

hardware and software tools can be used to create applications. The application is therefore a component of multimedia technology. It included various multimedia, such as:

1. Laptop

The educational sector has started providing laptops to teachers through several programs (Moses et al., 2009). The favorable effects of laptops on teachers' professional and personal growth, as well as the tools, knowledge, and circumstances that made it easier for them to incorporate ICT into their daily life, were proven by Rutledge et al. (2007). To enhance better that the usage of computers leads to greater student learning, professional development for teachers must place a strong emphasis on the pedagogical elements of laptop implementation (Inan & Lowther, 2010). In conclusion, the adoption of laptops has a positive effect on teaching design and the learning environment.

2. Smart Application Creator

One of the applications that can be utilized as a teaching tool is Smart Application Creator (SAC). Smart Application Creator (SAC), according to Azizah (2020), is a desktop tool used to create apps for ios without using any programming languages. SAC could be used as an alternative tool for offline learning because it doesn't require Internet limits. Additionally, it contains features like PowerPoint and e-book presentations that make it simpler for students to comprehend the material being presented. It might have interactive images, videos, music, and a menu. In short, the students happily accept this straightforward performance.

3. Canva

According to Wijayanti (2022), Canva is a great tool for teaching English. Canva is another simple-to-use application for teaching English that enhances the teaching and learning process and is simple to disseminate. Canva is simple to use because it offers all the requirements needed for teaching and learning, including videos, images, and colors. Additionally, Canva develops into an engaging app and a practical solution for the teaching and learning process.

4. Microsoft Teams

Microsoft Teams, according to Barus et al. (2021), is indeed an integrated collaboration and communication platform that incorporates work discussions, video meetings, storage services (including file sharing), and application integration. This application integrates with Office 365 licenses and can also be used with non-Microsoft products. Furthermore, it enables the students to experiment with informal discussions, make quick changes to tasks, work with team documents, and collaborate with others in the creation of a final result (Fernando & Calvo, 2021). It can be concluded that Microsoft Teams is regarded as an innovative platform with unique features that enable English teachers to manage increased engagement and create a positive learning environment.

5. Padlet

According to Lysunets & Bogoryad (2015), Padlet is used to cooperate in collecting ideas, discussing, and more. Padlet also aims to gather website inquiry

hyperlinks and data by keeping the wall accessible to comments, solicit feedback, discussion, or student perspectives. Padlet was the main platform used by students to cooperate, communicate, and share opinions with their classmates and the teacher (England, 2017). Implementing Padlet in teaching English classes has been shown to enhance student engagement and motivation.

6. Quizizz

Quizizz, according to Zuhriyah & Pratolo (2020), is a popular assessment tool in practically all stages of education. Quizizz offers multi-player games that make classroom sessions more involved and enjoyable, such as giving answers. Students can use their mobile devices to participate in interactive classroom activities with this application, enhancing their experiential learning. Quizizz is extremely beneficial to both students and teachers because the student pace appears on each student's screen, allowing them to answer questions at their leisure and check their answers at the end. The teacher also received detailed class and student-level insights for each quiz and could export the report as an Excel file (Lestari, 2019). It is a fantastic way because teaching often does not rely on textbooks and paper as the media.

7. Kahoot

According to (Lestari, 2019), Kahoot is a tool or platform that may be used to play a game, quiz, have discussions, and as assessments. It has since emerged as a substitute for using interactive game tests to encourage competition. Susanti (2017) mentions that Kahoot has three components-the quizzes, surveys, and discussions can be used as an evaluation tool, a conversation starter, and a tool to encourage students' discussion of any particular English topic. The Kahoot mode that teachers choose to utilize in the classroom is entirely up to them. Theoritical courses like linguistics, grammar, reading, and other topics can be taught through quiz.

8. The Internet

The internet, according to Gordon (1995), is the world's largest computer network, linking millions of computers. The Internet is very useful in the activities of teachers and learners in the education sector; using the Internet, they may develop their abilities, and they can search for and continue growing skills using the various features available on the Internet. Using the Internet for focal discipline research not only develops higher-order thinking abilities but also encourages critical and social literacy when learners engage in a range of material and integrate this through cooperation and collaboration with their peers.

9. LCD Projector

LCD projector is one of the media that can allow the teacher to present material on a large screen, such as material in the form of a graphic, text, PowerPoint, or video. By using this multimedia, all of the learners in the classroom can see the material that the English teacher has provided them, because it can make little text and small photos on the laptop appear larger when displayed on the screen (Agustia et al., 2017). Thus, the LCD projector is often used by the teacher in teaching English, as using the LCD projector makes it easier for the teacher to deliver the material.

10. PowerPoint

According to Barbara (2016), PowerPoint is the most well-known and widely used tool nowadays. Its popularity is expanding since it is thought to have a substantial impact on teaching and learning. PowerPoint contains animation, graphics, color, and fictitious elements. PowerPoint also enhances four language acquisition skills: listening, speaking, reading, and writing. This tool stimulates the imagination, aids comprehension, and enhances short and long-term memory.

Based on the description described above, it could be concluded that multimedia technology came in a variety of ways. Some of them included such hardware and software as laptops, the internet, LCD projector, and PowerPoint. Some of the others included in the application, such as Microsoft Teams, Padlet, Quizziz, and Kahoot. Each of them had a different function. However, knowing every type of multimedia technology made it easier for the teacher in teaching English.

Teachers' perspective on multimedia technology

According to Tanjung (2019), teachers' perspective toward multimedia technology has a significant impact on students' learning quality. Masruddin (2014) identified two patterns in the use of multimedia technologies in the teaching and learning process. First, teachers see that the use of multimedia technology causes a fundamental change in the classroom, which creates issues for teachers who see the change including at odds with broader educational paradigms. Second, teachers see teaching as an important part of implementing multimedia technology in the classroom. As a result, teachers have their perspectives on using multimedia technology. Teachers' and students' perceptions may differ; yet, the teacher's perspective is significant since it can be used as feedback to enhance the teaching learning environment.

There were several aspects of the teacher's perspective on using multimedia technology. The important aspects of the teacher's perspective were the types of media that could be used to teach English, their advantages and disadvantages, and how media were used. Using these aspects made it easier to instrument making and dig deeper into the teacher's perspective on multimedia technology.

Method

This study used a qualitative research method with a phenomenological approach. It aimed to find out teachers' perspectives on multimedia technology in teaching English. A qualitative research method called the "phenomenological approach" looks at people's statements of their experiences to understand how they feel (Katrina, 2005). The researcher used observation and in-depth interviews as the instruments to gather the data for this study. The researcher gained information on the learning situation in the classroom through observation, as well as the types of media the English teacher used, and the classroom activities that took place when they used media to teach English. The researcher learned more about how teachers utilize media to teach English by observing classroom activities. The English teachers at SMA N 2 Semarang were the subject of a part of the researcher's interview. To learn more about the advantages and disadvantages of using those media in teaching English, the researcher conducted an in-depth interview. By using

this instrument, the data loss could be prevented and the validity of the data was ensured. The research used expert judgment to validate the instruments.

Expert judgment was part of the content validity. Content validity was one of the assessments assessed by testing the worthiness or relevance of the test's content by rational analysis by the panel of competent or expert judgment (Crocker, 2015). The study applied triangulation. According to Sugiyono (2018), triangulation is a way or technique for data collection that can combine or join existing data collections and sources. this study used thematic analysis in qualitative research. Thematic analysis, as defined by Khokhar et al. (2020), was the process of locating patterns and themes in the data. This started at the data collecting phase and lasts through the transcription, reading and re-reading, analysis, and interpretation stages of the data.

Findings and Discussion

This section consists of the finding and discussion related to the question of the study, which was about the teachers' perspective on using multimedia technology for teaching English. There are three sub-chapters, such as (1) Multimedia technologies used by English teachers, (2) The advantages and disadvantages of using multimedia technology, and (3) The teachers' perspective on multimedia technology use.

Multimedia technologies used by the English teachers

According to the descriptions in the sub-chapter, the two English teachers at SMA Negeri 2 Semarang who taught 12th grade already used multimedia technology in their teaching and learning process. The use of multimedia technology in teaching English is as important (Masruddin, 2014). The teachers taught English by using a variety of multimedia tools. This was proven when the researcher observed the students learning English in the classroom. The first teacher used SAC and Quiziz, whereas the second used Quiziz, Powerpoint, the LCD projector, and the laptop. This was consistent with the findings from the interview section:

> *"So many. SAC, Kahoot, Quizizt, Canva, Padlet, Powerpoint, Laptop, Internet, and LCD projector are used."*
>
> *"Canva, Kahoot, Quiziz, Padlet, Powerpoint, LCD projector, Laptop, and the Internet,. Microsoft teams used to be offered by the school."*

In conclusion, the two English teachers used a variety of media, including Smart Application Creator (SAC), Canva, Kahoot, Quiziz, Padlet, Powerpoint, LCD projector, laptop, the Internet, and Microsoft Teams. According to the subject matter and learning goals, they regularly used it in meetings.

The advantages and disadvantages of using multimedia technology

Based on the observation and the in-depth interview, the researcher concluded all the advantages and the disadvantages. The following are some of the advantages:

1. Some media, like SAC and Powerpoint, could be used even when the network was unavailable. The slides just needed to be slid to play the media. Therefore, using this media did not require access to the internet. This was

shown when the researcher observed the class using SAC and Powerpoint for learning. The teacher also stated the following in an interview:
"Yes, SAC itself can be utilized even when the network is down, therefore there are no quota concerns."

2. The use of media made it simple for English teachers to deliver the lessons. For instance, English teachers used PowerPoint presentations to teach English. Before the lesson was given in front of the class, the English teacher utilized Powerpoint to highlight the points. As a result, it made it easier for them to recognize what they need to teach their students.
3. The students excitedly and enthusiastically responded to the teachers' questions. For example, most of the students in the classroom actively participated in responding to the teachers' questions while the English teacher used tools like Quiziz or Kahoot to teach English. To enhance the student's interest, the English teacher added more images and recognizable sounds.
4. The application was simple to install. The students did not have any trouble utilizing the application because they only needed to install the application through the Link that had been prepared by the teacher, as the researcher observed during the class. The teacher listed the following in the interview: "*The application is equally simple to set up; all you have to do is click the apk file I supplied to the WhatsApp group to launch the main menu. Don't waste your time with the intricate lists found in other programs."*
5. Teaching was organized and one-way. It meant that teachers could be taught different classes by using the same media template that had been made before. Therefore, multimedia technology was needed desperately to help teachers organize them because it certainly is the same while teaching one class and another. The requirement of multimedia technology in the teaching process was due to the teachers' engagement in a variety of classes. Noted in interviews:
"Because we already have a template that has been created in the media, we teach from one class, and the other classes are identical. As a result, it continues to go in the same direction as it does in its lessons."
6. The laptop made it easier for English teachers to discover the information needed. By using a laptop that was connected to the projector, the English teacher could display PowerPoint, Kahoot, Quiziz, SAC, and Canva on a large screen. It enabled the students to see the materials specifically and clearly.
7. Students' attention could be caught through multimedia technologies. The observation demonstrated that multimedia had an attractive design. It boosted students' interest in learning English.
"Different application features are displayed in Quiziz, SAC apps, and PowerPoint with eye-catching text styles, interesting backdrops, and supporting animations that can grab students' attention. Applications like Quiziz and SAC have sound capabilities when the application is running."

Based on the discussion above, it could be concluded that multimedia technology had many advantages. As could be seen that each multimedia had its

benefits. It was all for making the teachers easier in the learning-teaching process and making the classroom more lively and sightly.

The use of media in teaching English had certain disadvantages, including:

1. Media took up a lot of space on a cellphone. In contrast to typical teaching tools like PowerPoint, LCD projectors, and laptops, media in the form of applications used more RAM on a phone. In the interview, the first respondent stated:
   "It takes phone memory, especially if it is limited. The problem is that since it is an application form, thus, more RAM space is needed."
2. On occasion, the English teacher was unable to manage all of the students in the classroom because they were too focused on the media being used. According to the researcher's observations, when the English teacher employed the media, several students engaged in conversation with other friends or cracked a joke.
3. The usage of multimedia had technical limitations. As stated in the interview by the second respondent:
   "My shortcoming is that I occasionally run into technological issues when one media does not always connect to another. It is not a big deal, though. For instance, you can connect Quiziz or Powerpoint to the LCD projector and speakers, though sometimes the connection takes a while.
4. The creation of teaching tools like PowerPoint, Canva, and SAC took a lot of time for English teachers since they need to create them as creatively as possible to get students' attention.

It was clear from the discussion above that there were a few disadvantages to multimedia technology. It was just about how the teachers could organize the learning process. Therefore, the teachers did not see this to be a significant concern because they had the solution to that difficulty. Rahmi (2014) stated that the use of media in the teaching-learning process had some benefits and weaknesses.

The teachers' perspective on multimedia technology use

Based on the researcher's observations and interviews, there were also numerous ways that the English teachers used the media to teach English. Smart Application Creator (SAC) was the first media. This media was being used by the teacher to teach the subject "song". By using this media the English teacher allowed the students to read the material on their application, then they could do some evaluations that the teacher had been prepared in the media. It helped the students grasp the material better. The second medium was Quiziz. The teacher used this media to warm up the students because this media was game-based, starting with a few questions so that the students were enthusiastic about learning first. This media was very exciting because the student's scores could be seen. The students participated more actively as a result.

PowerPoint was the third material that was displayed on the screen. One of the media that was being considered to be used in teaching English was Powerpoint. The English teacher created slides for this media that included images, texts or paragraphs, and videos. While presenting texts and images, the English teacher employed this format. By using PowerPoint, the teacher explained the subject. Additionally, the teacher requested that the students described anything they could remember about the Powerpoint slide pictures. A laptop was the fourth type of

media. It enhanced the capacity to show texts, images, powerpoints, and movies. The LCD projector was the final media. When the teacher needed to show various types of material, such as images, texts, videos, and PowerPoint slides, the English teacher used this media. Agustia et al. (2017) stated that English teachers used media in a variety of ways to teach English.

Conclusion

It could be concluded that the English teachers at SMA N 2 Semarang used ten media to teach English to students in the 12th grade. These media included Smart Application Creator (SAC), Canva, Kahoot, Quiziz, Padlet, Powerpoint, LCD projector, laptop, the Internet, and Microsoft Teams. The first teacher used SAC, Kahoot, Quizizt, Canva, Padlet, Powerpoint, Laptop, the Internet, and LCD projector, whereas the second teacher used Canva, Kahoot, Quiziz, Padlet, Powerpoint, LCD projector, Laptop, the Internet, and Microsoft teams. The teachers utilized multimedia technology in a variety of ways, it depended on the material being delivered. Teachers perceived that the use of media in teaching English had some advantages and disadvantages. Each multimedia had its benefits, such as SAC and Powerpoint could be used even when the network is unavailable, the application was simple to install, the laptop made it easier for the English teachers to discover the information needed, the use of media made it simple for English teachers to deliver the lessons, the students excitedly and enthusiastically responded to the teachers' questions, teaching was organized and one-way, and students' attention could be caught through multimedia technologies. Furthermore, if such media were used improperly, the media became ineffective. For instance, employing that media could be time-consuming. The teacher was unable to manage all of the students in the classroom. It was because they were too focused on the media being used, the usage of multimedia had technical limitations, and the media took up a lot of space on a cellphone. In short, the study's conclusive finding demonstrated that the teachers perceived the use of multimedia technology as extremely beneficial in teaching-learning in the classroom. Multimedia technology had so significantly contributed to the progress of education, especially in learning English.

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TEACHER STRATEGIES IN IMPLEMENTING HINDU LEARNING FOR EARLY CHILDHOOD

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Abstract
The purpose of this study is to describe teacher strategies in implementing Hindu nuanced learning, the lack of information related to the teacher in its application so that there needs to be an innovation created by the teacher to provide good practices for early childhood education through several learning strategies used by class teachers in one of PAUD Pratama Widya Pasraman in Tabanan district. The research method used is qualitative research with taxonomic data analysis techniques. The results showed several teacher strategies in implementing Hindu nuanced learning, divided into the *first* three stages, understanding Hindu nuanced learning. *Second*, planning learning, and *Third*, management in the learning process. The Hindu nuanced learning that is instilled is the concept of Tri *Kaya Parisudha, Tri Pramana, Dwi Pramana, Eka Pramana, and Catur Guru*.

Keywords: early childhood, Hindu nuanced learning, teacher strategy

Introduction

Education for early childhood is one of the most important things to create a superior next generation of the nation. Children are given early education based on the stages of development to develop their abilities following their interests and talents. In line with Burke's opinion, children need meaningful activities to reflect on their daily experiences. The construction and reconstruction of knowledge that develops based on events and Direct actions constitute the foundations of development for children to do, possess, think, and interpret their imagination (Khomais & Gahwaji, 2019). This is largely determined by the stimulation provided in early childhood education. Teachers need the right learning strategies for children to achieve their goals.

Currently, education for early childhood requires learning strategies that are by the objectives of learning in each ECCE unit, especially in the education of religious and moral values. Instilling religious and moral values is very important from an early age, and this is a good start for early childhood education to continue further education. Routine activities are one of the activities that can be done to

teach religious and moral values in early childhood. Currently, Bali is developing Hindu-nuanced (Salasiah, 2021). ECCE The existence of Hindu-nuanced ECCE is increasing every year with the issuance of the Regulation of the Minister of Religious Affairs of the Republic of Indonesia Number 56 of 2014 concerning Hindu Religious Education and the issuance of a Hindu-based Curriculum from the Director General of Hindu Community Guidance Number 84 of 2020 concerning the establishment of the Widya Pasraman Primary Curriculum. Local culture-based education can support the creativity of teachers and children to create culturally responsive activities (Sisson et al., 2020). The purpose of developing Hindu ECCE is to instill Hindu religious values that can be applied to everyday life based on local culture.

Teachers must shape student character and exemplary attitudes that foster enthusiasm, creativity, and social empathy (Lubis, 2020). Various demands are essential in appropriate learning, and then a teacher can choose a strategy to achieve the desired learning goals. The ineffectiveness of learning activities will significantly impact the quality of learning objectives in children. It will also not be achieved it will cause students will not get anything for their learning activities (Chan et al., 2019). To realize Hindu nuanced learning in early childhood, the teacher plays a role in determining learning strategies.

According to Gerlach and Ely, learning strategies are ways chosen to deliver learning methods in specific learning environments. Learning strategies include the nature of the scope and sequence of learning activities that can provide learning experiences to students and students. (Indriawati et al., 2021). According to Fadlillah, learning strategies can be interpreted as learning planning activities that contain a series of activities that must be carried out by teachers and students, including the use of methods and the use of resources to achieve effective and efficient learning objectives (Rahmawati & Nazarullail, 2020). Learning strategies can be defined as a method teachers use to carry out a learning process to achieve effective and efficient learning objectives.

So to apply Hindu nuanced learning to early childhood, several strategies are needed in planning and conducting learning that can provide maximum and meaningful results for early childhood in PAUD Pratama Widya Pasraman.

Method

This research is qualitative to determine the teacher's strategy in implementing Hindu nuanced learning in one of PAUD Pratama Widya Pasraman. This study was conducted for three months involving teachers of groups B1, B2, and B3. The researcher is a doctoral student in the Department of Early Childhood Education.

Participants

Participants in this study were three teachers who taught in groups B1, B2, and B3. Teachers in group B1 (34 years) have taken early childhood education, teachers in group B2 (26 years) are attending education (college), and teachers in group B3 (27 years) have nursing education. The study had received approval from the school and consent from teachers before the data was collected. Coding is done to make it easier for researchers to analyze interview data conducted with teacher codes of groups B1, B2, and B3, namely with codes G1, G2, and G3.

Data collection

Semi-structured interviews with teachers of groups B1, B2, and B3 collected data. The interview instrument guide is prepared based on the identification of experts and then concluded by the researcher so that the interview instrument consists of planning to learn and managing the learning process. Each research focus is divided into several sub-focuses to form several interview questions. There are 10 questions spread in the research focus related to planning learning and 14 questions scattered in the research focus related to management in the learning process. Interviews are conducted directly and continuously with WhatsApp video calls and documentation of activities in the form of photos and videos as additional data.

Data analysis

Data analysis begins with making a table of interview results and then coding to find the focus and sub-focus of teacher strategies in applying Hindu nuanced learning in early childhood. The data analysis technique used is taxonomy.

Results and Discussion

Hindu learning in early childhood

Teaching about the values of Hindu teachings can be done from an early age. Characteristics Early childhood (0-8 years) is the attitude of individuals experiencing a very rapid process of growth and development. Every parent and teacher understanding the characteristics of early childhood is very useful for providing stimulation to children correctly and by the stage of child development. Early childhood is in the golden age (the *golden age*) and has a sensitivity that is very sensitive to the circumstances that occur in the surrounding environment. Moreover, the incident is experienced himself (Idris, 2016). Direct and meaningful experiences can help children remember and understand. So to instill the values of Hindu teachings in early childhood, a teacher's strategy is needed to carry out a meaningful learning process.

Hindu nuanced learning in PAUD began to be developed, especially in Bali, based on the Regulation of the Minister of Religious Affairs of the Republic of Indonesia Number 56 of 2014 concerning Hindu Religious Education and then the issuance of a Hindu-based Curriculum from the Director General of Hindu Community Guidance Number 84 of 2020 concerning the determination of the Widya Pasraman Primary Curriculum. Religion is the most critical foundation for education. The science of education based on religion means that religion is a source of inspiration to compile knowledge or educational concepts and carry out education, so it is essential to teach religious values to Hindu students (Ayu et al., 2021). teachings taught in early childhood are more about applying values contained in Hindu teachings reflected in everyday life. These values can be applied in learning and have links with other aspects of development. So that Hindu nuanced learning can be applied and put into one activity with various other aspects of development.

To implement Hindu nuanced learning, teachers develop strategies. Before developing strategies for learning for children, the teacher first explores information related to Hindu nuanced learning by attending seminars and training and visiting other PWP ECDs that have also carried out Hindu nuanced learning.

> *"In addition to my knowledge of Hindu nuanced learning, I attended seminars or training held by local agencies and from the Ministry of Religious Affairs" (G1, initial interview, via video call April 13, 2023)*

> *"I visited PWP or other schools that apply Hindu nuanced learning to get information on what should be done" (G2, interview, initial interview, via video call Thursday, April 14, 2023)*

> *"Because we have just implemented it, we do more information from reading articles on the internet, attending training and sometimes calling friends who have carried out Hindu nuanced learning" (G3, initial interview, via video call Friday, April 14, 2023)*

The initial strategy carried out by teachers is to explore as much information as possible to understand the values of Hindu teachings that can be applied to early childhood and explore information on ways to apply learning to suit the theme used in schools. The school still uses the 2013 curriculum in the learning process associated with the values of Hindu teachings. It is important to instill religious and moral values early to create a noble human being. Culturing religious and moral values can be done by instilling positive character that is carried out daily so that children will grow into a religious, civilized, moral, and dignified generation (Salasiah, 2021).

Planning Lessons

The journey as an educator is challenging, let alone being an early childhood educator. Early childhood, famous for its unique characteristics, makes educators always think about finding interesting ideas with the themes presented. It is hoped that children can achieve their learning goals according to age and development. John Dewey's view of learning can influence children to learn to cultivate curiosity and think critically (Luff, 2018). The success of a learning achievement is based on teacher strategies, one of which is to plan learning.

The results of the study found that the success of teachers in implementing Hindu nuanced learning was carried out with several strategies. After being explained above that extracting information related to Hindu nuanced learning is increasingly understood by the teacher, then the teacher plans to learn by (1) determining themes and materials, (2) preparing media and materials, and (3) choosing learning models and methods used during the learning process. The strategy of an ECCE teacher in implementing learning must understand the stages of child development, provide experience and, more importantly, facilitate and stimulate to optimize the development of intellectual capacity for their students (Susanti, 2021). Because children can learn through direct experience with materials or materials closest to them, children can develop their curiosity through learning activities and foster their critical thinking. (Marpa, 2020).

> *"I prepare learning activities (objectives, materials, methods, media and evaluation) before they are carried out and relate them to Hindu values. For example, tomorrow, I will invite children to know orchid plants by inviting*

children to water plants, knowing that plants are equipped with one ability, namely eka pramana "Bayu" (ability to live)" (G1.1.1, interview, Friday, April 28 2023)

"Before doing learning in class, the teacher prepares learning materials so that when teaching, the teacher can direct the children". (G2.1.3, interview, Saturday, April 29 2023)

"I try to relate the material according to Hindu nuanced learning, but teachers usually associate it with teaching children by loving the creation of Ida Sang Hyang Widhi, knowing by mentioning His creation, associating Hindu-based singing and also patting. " (G3.1. 5, interview Friday, April 28, 2023)

One of the pats taught is:

Pat tri kaya parisudha:
Manacika 🖐🖐🖐 wacika 🖐🖐🖐kayika

The teacher plans to learn before carrying out learning activities by making a daily learning plan by determining the theme. The material to be delivered is planned and prepared related to the values of Hindu teachings. Teachers design learning so that learning is by the goals and achievements of learning and by the stage of child development, in line with Piaget's opinion that exciting and meaningful learning can develop new skills and build children's knowledge (Siegler & Ellis, 1996). Leen believes that teachers' role in education and learning will be an example for their students. Teachers need to learn in a fun, attractive, creative, friendly, and flexible (Lubis, 2020). After planning to learn with RPPH, teachers will prepare media or materials used in Hindu nuanced learning.

"I try to choose and find ingredients to be used and match and relate to Hindu religious values. For example: on the theme of plants, I take children to the fields and pick vegetables for you" (G1.1.7, interview Friday, April 28, 2023)

"The teacher invites the children to make canang sari, and the teacher has prepared the janur, spin, shaft and knife" (G2.1.7, interview Saturday, April 29, 2023)

"I try to choose media and materials that can be related to Hindu nuances" (G3.1.7, interview Friday, April 28, 2022)

The selection of media and materials to be used is based on RPPH, which the values of Hindu teachings have designed. Good learning media can support the learning process (Fuady&Mutalib, 2018). Children's passive attitudes can be overcome by learning media appropriately and varied (Putri & Solfema, 2019). Choosing media or materials to be used in learning is one of the right strategies to attract early childhood to carry out activities and understand the content of activity materials to achieve learning objectives.

For a learning objective to be achieved optimally, the following strategy that can be done is to choose the learning model to be implemented.

> *"For the selection of emm learning models... Usually we pay attention to components in learning, such as subject matter, adjusting to* school *facilities and if there is much time nike... " (G1.1.10 interviews Friday, April 28, 2023)*

> *"My friends and I will make a project activity, for example, getting to know the types of sweet potatoes by inviting children directly to look for them". (G2.1.10 interview Saturday, April 29, 2023)*

> *"I mostly use group and classical learning. Determined according to the purpose of learning, but for activities related to Hindu nuances, my friends and I will make an activity (project), for example, inviting children to know plants directly to the surrounding environment such as the fields, loving plants by watering and benefit plants such as sweet potatoes or kangkung (name of vegetable) that can be eaten". (G 3.1.10 interview Friday, April 28, 2023*)

The learning model used is adjusted to the nature of the material or theme, learning objectives, facilities, children's conditions, and time availability. Learning uses more group models to do more activities in the room, which aims to allow children to do activities together and work together. In contrast, classical is used when teachers start learning and end learning. Dewey's ideas about learning can be done by building children's interests and generating children's ideas through discussion activities in the morning (early activities) (Williams, 2017). According to the teacher, the project learning model is very interesting and fun for children. Children can explore their ideas and have meaningful experiences, and the material the teacher delivers is easy to understand.

Management in the learning process

The next teacher strategy after planning learning with several steps, namely management in the learning process. Teori by Albert Bandura (1977), where the theory states that learning is a cognitive process that can occur through observation of behavior in learning (Norman et al., 2015). environment A good learning process is believed to be carried out in the learning process. One of Dewey's works on the principle of interaction stated that learning will provide the child's experience to interact with other children and their environment to form a situation or so-called situational learning (Giles & Eyler, 1994). This study found that one of the strategies teachers aim to maximize the learning process is when managing the learning process, including:

(1) Review previous learning activities and those that will be carried out today.

> *"Quiet activities carried out by teachers before entering core learning activities to attract attention so that children focus more on new knowledge or experiences than I conveyed". (G1.2.1 interview Friday, April 28, 2023)*

"When delivering the previous lesson material, I can *see the response given by the child, whether the child can remember it or feel confused and forgotten". G2.2.1 Interview Saturday, April 29, 2023)*

"Yes, I usually do questions and answers at the beginning of activities to start learning" (G3.2.1 interview Friday, April 28, 2023)

Before starting the learning, children are also invited to pray:

Prayer before the activity:

"Om awighnam astu namo sidham ,om sidirastu tad astu swaha"

Puja Gayatri Mantram :

OM Bhur Bhuvah Svah, tat
O God, the creator of these three places
Savitur Varenyam
You are the source of all light and the source of life
Bhargo Devasya Dhimahi
Shine on this conscience
Dhiyo Yo no Pracodayat
Your Most Holy Light.

After praying based on Hindu teachings, the teacher performs apperception before entering the core learning activities, this aims to determine the level of children's understanding of the material that has been taught before and that has been done before so that children can understand the content and learning objectives. Especially in Hindu nuanced learning, children are expected to understand the values contained in the activities carried out, and then they can apply them in everyday life. For example, when children have conversations with teachers, parents, other adults, and friends should respect and respect each other (*kayika*), speak politely with good speech (*wacika*), and children can think well (*Manacika*) in Hindu teachings called *Tri Kaya Parisudha* (Wati, 2021).

(2) Cooperative learning and projects are considered learning models that can attract children to do activities together.

"We use more of the project-based learning model because our learning strives with more activities, doing activities in groups" (G1.2.5 interview Friday, April 28, 2023)

"For example, when we invite children to know cassava trees, children are immediately invited to take cassava trees and then invited to clean and cook, and children are invited to eat cassava that has been boiled so children feel the taste of cassava that they have taken themselves". (G1.2.6 interview, Saturday, April 29 2023)

Invite children to sing Song: Tri Kaya Parisudha (poem planting corn)

Hinduism is our religion
The holy book is the Vedic Kitab
A place of worship pure its name
Remember that; don't forget
We prepare incense flowers to say the trisandya puja prayer
3 x we pray, in a day we do
Manacika thinks right
Wacika speaks the right
Kayika did right
Tri kaya parisudha

The project learning model was chosen as one of the comprehensive learning processes accompanied by cooperation between children and teachers (collaborative, cooperative learning). The implementation of cooperative learning can be done by assigning tasks or problems that must be solved by children with real experiences so that children gain knowledge (Tsai et al., 2018). Activities are to get to know the casava tree; children are invited to take casava, clean and peel casava, boil cassava, and taste cassava together (eat cassava together). If associated with the concept of *Tri Kaya Parisudha* Against the child's learning process and outcomes, the cognitive realm can be measured through the application of *manacika*, the affective realm can be measured through the application of *wacika* and the psychomotor can be measured through the application of *kayika*.(Divayana et al., 2019)

One of the activities carried out by teachers and children before eating boiled cassava or before eating together is praying according to Hindu teachings:

Meal prayer:

Om amerthadhi sanjiwani ya namah swaha
O Lord, may this food be the life of the servant-born and pure mind

(3) Learning outdoors (*outdoor*s) is one of the right choices for teachers to invite children to get to know the surrounding environment, and children have natural (concrete) experiences.

> *"I usually take children to the surrounding environment to introduce something, for example, fish in the pond and vegetables in the fields" (G3.2.6 interview, Friday, April 28 2023)*

Using the surrounding environment is a fun learning activity for children. Children learn to know the surrounding environment, instilling the values of Hindu teachings more easily because children experience it themselves. For example, by walking around the rice fields, children learn not to pick plants that are passed, knowing that plants in Hindu teachings are equipped with one ability, namely ***eka pramana*** (ability to live)," for children are taught to always love plants by caring for them and giving water (watering). Children are also introduced to (Adnyana, 2021) ***Dwi Premana*** is a living creature that has two aspects the ability to speak (word) and who has the energy to live (Bayu); for example, animals that lay eggs, such as chickens. Children know that humans are equipped with Tri Pramana, namely the three aspects of the ability of the word, Bayu, idep. Man can speak

(word), man has the energy to live (Bayu), and man can think (idep) (Seken & Badra, 2019).

(4) The use of audio-visual media is considered as an alternative. When teachers cannot present concrete examples and understand the values contained in Hindu teachings, well-designed audio-visual learning media will help achieve learning objectives. Each type of audio-visual learning media has characteristics, advantages and disadvantages. Using audio-visual learning media can expedite the learning process and optimize the content of learning materials (Fuady R & Mutalib, 2018).

"Usually, audio-visual media are often used if teachers cannot bring concrete media and audio-visual media are also favoured by children because they are interesting, and strengthen the material to be delivered." G3.2.9 interview, Friday, April 28, 2023)

When concrete media cannot be presented in the classroom or does not exist in the surrounding environment, teachers use audio-visual media in the form of projector screens to watch videos together and use laptops if in the classroom. This strategy is very helpful for teachers to provide examples of learning or stories that provide messages of religious and moral values, especially to instill the values of Hindu teachings. Because it is challenging to find media with Hindu nuances, one of the teacher's strategies is inviting children to watch videos, for example, by introducing *chess* to children. The concept of teacher chess in the educational process can influence attitudes and learning outcomes, mutual respect, compassion, obedience to parents, teachers, and government, and order to God through religious teachings (Suardana, 2020).

(5) Showing children's work is very proud; children can tell their work, and teachers can see and assess children's abilities from learning to results.

" give positive feedback, such as positive words "Excellent" "Good" Or Your work is already good, but it must be improved again to make it better" (G1.2.12 interview, Friday, April 28 2023)
"Displaychildren's work, such as on the making or hanging on the wall (G2.2.10 interview, Saturday, April 29, 2023)

"Giving ratings in the form of stars, thumbs up, applause, and praise" (G3.2.11 interview, Friday, April 28 2023)

After conducting learning activities, the teacher invites children to show their work in front of the class. The children will be asked to tell their work if there is time. It can encourage children to tell stories about their work, and teachers can provide assessments from the process to the results shown by children. Teachers can give praise, stemple, and applause that adds to children's enthusiasm to continue to work and be active. The work can convey messages because it is easy to make and encourages children to learn actively (Faridawati et al., 2019).

(6) Assessing and evaluating learning, a strategy that has been prepared and implemented, will only be meaningful if it can measure the results of the learning activities.

" Usually, I will do different activities on competencies that the child has not achieved; the activities are differentiated from before" (G1.2.15 interview, Friday, April 28 2023)

"I usually give open-ended questions to children so that children want to answer, for example, by asking questions related to the values of Hinduism and what children have done, what was it for? For example, colouring children who are watering plants, Mrs. teacher…. then that includes deeds that ....? And so on... " (G2.2.12 interview, Saturday, April 29 2023)

"By reflecting on children's learning, if there is still time, I will plan follow-up activities for competencies that have not been achieved in children" (G3.1.14 interview, Friday, April 28 2023)

Assessment is also an essential part of the final stage of a learning implementation. The assessment results can be used as a benchmark to decide that learning objectives can be achieved. Conversely, suppose children still need to achieve the learning objectives. In that case, it will be planned to repeat by doing different learning activities but with the same learning objectives (which have yet to be achieved in children).

Conclusion

Implementing Hindu nuanced learning becomes a challenge for teachers, so to overcome this, teachers develop strategies for implementing their learning. The ***first*** thing teachers do is to understand Hindu nuanced learning by digging for information via the internet, attending seminars and training, and visiting PAUD Pratama Widya Pasraman, which has implemented Hindu nuanced learning, ***the second*** strategy, is to plan to learn, including designing learning, choosing media and materials, and choosing learning models. ***Third***, Management in the Learning Process includes: reviewing learning, choosing cooperative learning models and projects, utilizing the surrounding environment (outdoor learning), utilizing audio-visual media, showing children's work, and assessing and evaluating learning. The concepts of Hindu teachings taught to children are the concept of Tri ***Kaya Parisudha***, where in this concept, children are taught to be able to think well (Manacika), respect and respect parents and others (wacika), speak polite and good words (Kayika), children know that humans are equipped with ***Tri Pramana*** Those are the three aspects of the ability of Sabda, Bayu, Idep. Man can speak (sabda), man has the energy to live (Bayu), and man can think (video). ***Dwi Premana*** is a living creature with two aspects: the ability to speak (sabda) and the energy to live (Bayu), such as animals. Children know that maintaining plants is also good because plants are also equipped with one aspect of the ability to live (bayu / energy to live), namely ***eka pramana***. The values of Hindu teachings that are instilled are the ability of children to maintain their behaviour and speech and obey the Master,

obey parents, obey the government and obey God or Ida Sang Hyang Widhi Wasa, which is called the ***Catur Guru.***

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CHOOSING INCLUSIVE OR SPECIAL SCHOOLS FOR CHILDREN WITH DISABILITY IN INDONESIA: EDUCATIONAL PLACEMENT AND ANALYSIS OF RELATED FACTORS

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Abstract
Access to education remains a challenge for children with disability. In Indonesia, families can choose to send children with disability to either inclusive or specialized schools. This study aimed to identify the factors associated with the choice of sending children with disability to inclusive or special schools and factors linked to school dropout. Caregivers of children with disability in Java, Indonesia were interviewed to collect data on enrolment in school, sex and age of the children with disability, type of disability, parents' age and education, and independence of children with disability. The characteristics of children with disability studying in inclusive and special schools were compared. Logistic multivariate linear regression was done to analyze factors related to the choice of school. Data from 281 children with disability were analyzed: 175 (62.3%) of the school-aged children with disability were actively studying at school, with 84.57% studying in inclusive schools and 15.43% in special schools. Children's age, independence in daily activities, and ability to learn and play are factors that affect parents' choice of educational placement for children with disability. Children's age and mothers' age are variables influencing children with disability to drop out.

Keywords: children, disability, dropout, education, school placement

Introduction
All children, including children with disability (children with disability), have the right to education. The Indonesian government has taken measures to provide education for children with disability by encouraging inclusive education projects. The number of children with a disability enrolled in schools has increased dramatically from 15,181 in 2007 to over 400,000 in 2017(Poernomo, 2016) (Indonesian Ministry of Education and Culture, 2017b). Among these children, about 70% study in inclusive schools and 30% in special schools.

Despite all these developments, access to education remains a challenge for children with disability. In 2018, 20.51% of children with a disability never went to school, 29.35% did not finish primary school, 26.32% completed primary school,9.97% finished junior high school and 10.47% completed senior high school. While children without disability, 3.05% never went to school, 10.73% did not finish primary school, 24.76% completed primary school, 22,14% finished junior high school and 29.66% completed senior high school (Jayani, 2021). It is evident that children with a disability still face tremendous obstacles to obtaining an education.

The Indonesian government made policies to increase access to education for children with disability. In 2009 the Minister of National Education Regulation No. 70 about Inclusive Education was released. The government set regular schools to become inclusive schools. There were around 59,000 inclusive schools in 2019.

In 2020 there were 2,017 special schools: 552 state schools and 1,465 private schools (Katadata, 2021). Of 514 regencies and districts throughout Indonesia, there were still 62 regencies and districts that did not yet have special schools(Indonesian Ministry of Education and Culture, 2017a).

Factors influencing accessibility to education for children with disability have been reported in several studies. A study in India reported that access to education for children with disability was influenced by several factors including parents' perception of children with disability, disability severity, society's attitude toward disability, school staff and infrastructure, poverty, availability of support systems, and government policies on the education of children with disability (Limaye, 2016). Other studies reported various factors influencing parents' choice for their children with disability schooling were social economic status, school distance from home, government policy (Ball et al., 2013; Jacobs, 2013).

There is still very little known about factors affecting parents' choice to send their children with disability either too inclusive or special schools. Identification of the factors can improve the school enrolment for children with disability. This topic has not been well studied, including in Indonesia.

This study aimed to study the school placement of children with disability and identify factors affecting the decision to send their children to school, choice of school, and dropout rates of children with disability studying in inclusive schools, studying in special schools, and never going to schools in Java Island, Indonesia.

Methods

This study was a cross-sectional observational study using consecutive sampling. Data were collected in three districts: Gunungkidul and Kulonprogo Districts in Yogyakarta Special Province, and Situbondo District in East Java Province. Two villages were chosen in each regency: Bejiharjo Village (Karangmojo District) and Wonosari Village (Wonosari District) in Gunungkidul Regency, Margosari Village (Pengasih District) and Giripeni Village (Wates District) in Kulonprogo Regency, and Kendit Village (Kendit District) and Olean Village (Situbondo District) in Situbondo Regency.

The target population was children with disability and their families in Yogyakarta and East Java, Indonesia. Subjects with an unclear disability or aged 18 years and above were excluded. Data collected included the sex of the children

with disability, type(s) of disability, father's and mother's educational level, enrolment in school, and independence of children with disability.

School enrolment was classified as children that had attended formal school and children who had not. Children who attended school were further classified based on the choice of school (inclusive or special) and whether the child dropped out or not. Independence was assessed using a questionnaire based on the Washington Group Extended Set on Functioning, with additional questions on learning, playing, and self-care (The Washington Group on Disability Statistics, 2008).

Data were obtained through face-to-face interviews with the parents or primary caregivers of children with disability. Interviews were done by trained community health volunteers. They interviewed parents or primary caregivers of children with disability.

Statistical analyses were done for children with disability aged 7-17 years of age who had ever been enrolled in a formal school, in accordance with the compulsory school age in Indonesia. Several children aged 6 years were already studying at primary school, these children were also included in the analysis. Logistic multivariate linear regression was done to analyze factors related to (1) whether children with disability were enrolled in inclusive or special schools and (2) whether children with disability stayed or dropped out of school.

Ethical clearance for the study was obtained from the Ethics Committee for Health Research, Faculty of Medicine, Duta Wacana Christian University.

Findings and discussion

Findings

Characteristics of children with disability

Overall, data were collected from 300 children with disability and their families. However, data from 19 children were excluded because of unclear disability, double data or aged older than 18 years. Overall, data from 281 children with disability were analyzed: 115 from Situbondo Regency, 96 from Gunungkidul Regency, and 70 from Kulonprogo Regency. The characteristics of children with disability and their parents are presented in Table 1.

The average age of the children with disability was 9.76 years, with nearly half (48.4%) of the children aged 7-12 years. Most of the children with a disability had single disabilities, with sixty-three (22.42%) children with disability with multiple disabilities. Of the school-aged children, 62.3% were actively studying at school, with 6.2% being dropouts and 10% never experiencing formal education. Among the children with a disability still studying at school, about four-fifths (84.57%) study in inclusive schools, and the rest (15.43%) in special schools. Difficulty in learning was reported for a majority of the children with disability (85.59%), but less than a third (28.38%) of the families reported any difficulties in ADL.

Factors predicting choice of school placement

Table 2 compares the characteristics of the students in different educational settings and whether they dropped out of school. Children with a disability going to special schools had significantly older ages than children with disability in inclusive schools, with a slight difference of 1.3 years on average. More children

with disability in special schools had difficulties with learning, playing, and ADL. Mothers' education was higher in the group of children with disability studying in inclusive schools. Among the children with disability who dropped out of school, the children with disability and their parents were older than the children with a disability still going to school. The proportion of children with disability with multiple disabilities was higher in the dropout group than in the actively studying group.

Univariate logistic regression was carried out to identify factors that have a potential effect on education placement and dropping out of school. The result was presented in Table 3. Age, single/multiple disabilities, and difficulties in learning, playing, and conducting daily activities were found as significant variables.

Hierarchical multivariate logistic regression was done to identify factors affecting parents' decisions about whether to send their children to inclusive or special schools. The results were presented in Table 4. Younger age and higher independence (less difficulty in playing, and learning, and more independence in doing daily activities) predicted placement in inclusive schools.

Factors predicting school dropout

Multivariate logistic regression for dropout was conducted and the result could be seen in Table 5. The age of children with disability and mothers' age were the only significant predictors of dropout. Those who dropped out of school were significantly older and had mothers who were older than the children who stayed to finish their schooling.

Discussion

Characteristics of children with disability

This research reported data from 281 children with disability. The most common disability found among the children with disability in this study was intellectual, followed by behavior and emotion, vision and mobility. The Indonesian Central Body of Statistics conducted the 2015 Intercensal Population Survey and reported that among the population aged 10 years and over 8.56% of them had a disability: 6.36% had visual impairment, 3.35% had hearing impairment, 3.76% had difficulty in walking or climbing stairs, 1.30% had difficulty in using their fingers, 2.81% had memory disorder, 1.40% had emotional and behavior disorder, 1.52% had communication disorder, and 1.02% had difficulty in doing activities of daily living (Badan Pusat Statistik, 2015). The Ministry of Health reported that 3.3% of the 5-17 years, 22% of the 18-59 years, and 26% of ≥60 year population had a disability, but there was no data based on the type of disability (Kementerian Kesehatan RI, 2018). The different findings in the proportion of different types of disability of this study from the national data may be caused by the different ages of the population surveyed. Almost one-fourth of the children had multiple disabilities. National Census conducted in 2012 estimated that 29.97% of people with disability in Indonesia had multiple disabilities (Mujaddid, 2014). The 2015 Intercensal Population Survey estimated that multiple disabilities were found in 50% of people with disability. Disability data in Indonesia is still problematic because of the different questions asked to respondents. UNICEF reported that different percentages of disability would be found when different questions were used in the survey (UNICEF, 2013). The

Indonesian government needs to develop a standard questionnaire to collect disability data.

The education data showed that 87.4% of this study's subjects of school age went to school, either too inclusive or special schools. The 2018 National Economic Census reported that 72% of children with disability were enrolled in schools (UNICEF, 2020). The percentage found in this study was higher than the national number. This might be caused by local variation across Indonesia. Inclusive and special schools were concentrated on Java island, so children with disability living in Java had more opportunities to access formal schools (Ediyanto et al., 2017). A report wrote that 83.9% of children with disability in Yogyakarta Special Province, which was located on Java island were enrolled in schools in 2016 (Harian Jogja, 2018). This study took place in Java island and this might explain the higher percentage of children with disability enrolled in schools compared to the national percentage.

Most (84.6%) children with disability who were still actively studying went to inclusive schools. The Ministry of Education reported that in 2017 around 414,000 children with a disability went to school and 72.2% of them were enrolled in inclusive schools (Indonesian Ministry of Education and Culture, 2017b) (Indonesian Ministry of Education and Culture, 2017a). The Indonesian Education Minister Regulation No. 70 the Year 2009 required the municipality and regency government to assign at least one elementary school and one junior high school in every district to be inclusive schools and one senior high school to be inclusive schools (Peraturan Menteri Pendidikan Nasional No.70 Tahun 2009, 2009). The local government in Java were more prepared to adhere to this regulation and even had more mainstream schools that accepted students with disability ((Harian Jogja, 2018; Kumparan, 2019; Supriyatno, 2019). The fact that there were quite many inclusive schools in Java might explain the higher percentage of this study's children who studied in inclusive schools than that of the national data.

The percentage of children with disability of school age enrolled at formal schools was quite high, yet it was still lower than that of children without disability. The 2018 National Economic Census reported that 99.6% of children without disability studied elementary school, 86% went to junior high school and 69% learned at senior high school (UNICEF, 2020). The data showed that compared to children without disability, those with a disability still did not have equal access to education.

This study found that 85.6% of children with a disability had difficulty in learning, 40.1% in playing, and 28.4% in performing activities of daily living. The difficulty was found in all kinds of disability. This finding was different from a study that reported greater difficulties in performing daily activities was found in children with physical or intellectual disabilities (Chan et al., 2019). This difference might be caused by differences in the instrument used. Chan et al. (2019) used the Barthel Activities of Daily Living index, while this study asked parents to rate the level of their children with disability's ability in conducting daily activities.

Children with a disability going to special schools had significantly older ages than children with disability in inclusive schools, with a slight difference of 1.3 years on average. More children with disability in special schools had difficulties with learning, playing, and ADL. Mothers' education was higher in the group of children with disability studying in inclusive schools. Factors predicting

placement of children with disability in inclusive schools are younger age and higher independence (less difficulty in playing, learning, and ADL).

Among the children with disability who dropped out of school, the children with disability and their parents were older than the children with disability who still went to school. The proportion of children with disability with multiple disabilities was higher in the dropout group than in the actively studying group. The older age of children with disability and older mothers' age were significant predictors of dropout.

Factors predicting choice of school placement

Children's age, independence in daily activities, and ability to learn and play were factors associated with parents' choice of their children's school placement. Children of older age with higher dependence on daily activities and more difficulties in learning and playing were more likely to study in special schools.

Children with disability experience more bullying than children without disability. A recent meta-analysis of global violence against children with disability reported that overall 31.7% of children with disability experience violence and the odds ratio was 2.08 compared to children without disability (Fang; et al., 2022). Children studying in either inclusive or special schools have been bullied. However, those with more evident disability reported more bullying (Swearer et al., 2012). Children with more learning and playing difficulties show more observable disability and are more likely to be targets of bullying.

Including a child(ren) with a disability in an ordinary class is quite a challenge for a teacher to overcome. Teachers have to create a learning environment that appreciates differences (Nilholm & Alm, 2010). Moreover, the class size of inclusive schools is bigger than that of special schools. Some studies in Indonesia reported bullying against children with disability studying in inclusive schools due to various factors including a lack of teachers' understanding of bullying especially (Roziqi, 2018; Sakinah & Marlina, 2018).

The fear of possible bullying in inclusive schools and concern of inclusive school teachers' burden might have influenced parents' decision to send their children with disability with greater difficulty in learning, playing, and doing daily activities to study in special schools.

Children with disability's age was also a significant factor influencing parents' decision for school placement. Those studying in the special schools were older than those in the inclusive schools. Those children likely have more severe disability in learning that the parents decided to wait expecting their children to become abler before sending their children to school. Finally, they decided to send their children to special schools considering the children's age and disability severity.

Factors predicting school dropout

The age of children with disability and mothers' age were predictors of school dropout. Children who dropped out of school were significantly older and had mothers who were older than those who stayed to finish their studies. One of the factors affecting students dropping out in Indonesia was the inability to go to the next level (Yanti et al., 2019). Students who have to repeat the same grade in the following academic year are usually older than the other students in the class.

Another Indonesian study reported older age as one of predicting factors of dropout (Kusbudiyanto & Munandar, 2020). Possibly those students feel ashamed and are more likely to drop out. The factor of mothers' age may be linked to the older age of the children with disability.

Implications

This research showed that special attention is to children with more severe learning, and playing disability, or more dependence on activities of daily living to ensure that children with disability's right to education is fulfilled. Indonesia has social security program for families that have a member(s) with a disability. Beneficiaries of this program receive an allowance quarterly and have to join meetings with a social worker every three months. The government can include a condition that the member with a disability of school age should go to school for the family to be eligible for the disability allowance. Besides making this a condition for receiving an allowance, the social worker should also provide support for the family including finding a school to accept the child, mediating communication with the school, and other support during the schooling to prevent dropout.

Limitations

Data on the children with disability's level of difficulty in learning, playing, and doing daily activities were based on the subjective perception of parents or caregivers of children with disability's perception.

Conclusions

More than half of Indonesian children with disability are actively studying at schools, more than 80% go to inclusive schools, and the rest go to special schools. schooling in is studied. Of the school-aged children, 62.3% were actively studying at school. About 85% have difficulty in learning and 28% have difficulty in doing daily activities independently. Children's age, and difficulties in learning, playing, and conducting daily activities are factors predicting parents' choice to send their children either to inclusive or special schools. The age of children with disability and mothers' age are the significant predictors of dropout.

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PEDAGOGICAL ISSUES OF TRANSLANGUAGING PRACTICE IN INDONESIA: THE VOICE OF FOUR EFL TEACHERS

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Abstract
In Indonesia, many pedagogical stakeholders may not be familiar with translanguaging practices in EFL education. Indonesian EFL teachers may unconsciously have practised translanguaging in their classrooms, but they may not be aware that they have practised the activity. To explore the perspectives and beliefs about translanguaging, this study involves four Indonesian EFL teachers from four different geographical areas in Indonesia. Two of them teach EFL in formal education, while the other two in informal education settings. The data was collected by conducting an in-depth interview with each of them. Based on their perspectives, this study reveals four main pedagogical issues in translanguaging practice. They are (1) confusion of the concept, (2) institutional policy, (3) cognitive and social gains, and (4) complication. These four issues indicate that while theoretically translanguaging is said to potentially encourage learning, it still creates some controversies about whether or not it can lead success to in EFL learning. This study suggests that the implementation of translanguaging practice in the Indonesian context should depend on typical situations in every EFL classroom. Teachers should consider, among others, learners' diverse backgrounds and also their existing linguistic repertoire, including their L1 knowledge. In making EFL learning meaningful, learners' needs should be a priority.

Keywords: EFL teaching, EFL learning, Indonesian EFL teachers, pedagogical challenges, translanguaging

Introduction
In this globalisation era, the translanguaging practice has become an option in foreign language pedagogy. It has been quite often applied by teachers to replace the monolingual ideology in teaching a foreign language (Cenoz & Gorter, 2020; Putri & Rifai, 2021; Raja et al., 2022; Sahib, 2019; Ticheloven et al., 2019; Wei, 2011, 2022; Yuvayapan, 2019). A number of pedagogical scholars believe that by engaging students' full linguistic resources in learning English, teachers have a more dynamic approach to teaching more complex content (Canaragajah, 2011; Emilia & Hamied, 2022; García, 2009; García & Lin, 2016; Ticheloven et al., 2019; Wei, 2011). Some other scholars align with the concept of translanguaging to be

implemented in language learning as it can provide sufficient training to educators and policymakers in designing the curriculum, developing teaching materials, and evaluating the students' language skills (Turnbull, 2018; Yuzlu & Dikilitas, 2021).

On the other side, quite many policy-makers in schools or institutions worldwide discourage the use of first language in EFL classrooms (Fallas-Escobar & Dillard-Paltrineri, 2015; Solhi & Büyükyazi, 2011; Yuvayapan, 2019). They believe in the theory that the target language must be consistently used as the only medium of communication as it can facilitate the effectiveness of learning the target language. One reason why translanguaging should not be implemented is that EFL learners may not have many opportunities to use the target language outside the classroom, and so "maximizing the use of FL in the classroom is very important" (Solhi & Büyükyazı, 2011, p. 860).

For EFL learners, the translanguaging instructional approach offered in multilingual classrooms has also received different reactions. Several students in Ticheloven et al.'s study (2019) expressed their "joy in mixing languages", but some others reported their confusion "when alternating languages" (p. 17). Such attitude was also found in Carstens's (2016) work, in which most university students in South Africa found that translanguaging practice assist them in 'meaning making' (p. 211) and 'making sense of the concept' (p. 214). However, some other students found that translanguaging does not help them in 'developing competence and confidence in English' (p. 216).

Whether educational stakeholders would acknowledge the cognitive and affective gains of translanguaging (Liu & Fang, 2022; Wei, 2017, 2022) or not, teachers are expected to adapt to the situation inside the classrooms and face the true identity of their learners. Otherwise, the application of methodological theories into practice may bring no benefits to the students. Teachers should also be aware that learning a foreign language is process-based, and therefore, if they believe in the application of translanguaging, the way they practice it may differ from one class to another (Rasman, 2018).

Meanwhile, EFL teachers normally see the use of the first language as a 'nuance' to be either embraced or banished from EFL teaching (Raja et al., 2022). Many hold positive perspectives about this teaching methodology, yet on the other side, some teachers perceive this as impractical (Fallas-Escobar & Dillard-Paltrineri, 2015). Those who agree would say that translanguaging is a good resource for learning which can encourage students to get connected in the global society (García & Wei, 2014). On the other hand, those who are against it may argue that translanguaging is an "underdeveloped" pedagogical approach (Canaragajah 2011b, p. 8) or that it is too "simplistic" (Ticheloven et al., 2019).

Numerous studies have been conducted to investigate the effects of translanguaging in EFL pedagogy, including the ones that took Indonesian EFL classrooms as the setting (e.g., Berlianti and Pradita, 2021; Emilia & Hamied, 2022; Khairunnisa and Lukmana, 2020; Putri & Rifai, 2021; Rasman, 2018; Sapitri et al., 2018; Saputra, 2020; Saputra & Akib, 2018). The participants involved in those studies were all Indonesian teachers or students in formal schools. To date, EFL learning in informal education is underexplored. Furthermore, as far as our knowledge is concerned, no comparative studies on translanguaging practice have been conducted across regions in Indonesia. This present study, therefore, fills the gap in the literature as it involves four Indonesian teachers from both formal and

informal education in four different regional locations in Indonesia. Two of them represent formal education and the other two represent informal education settings. This study, which is based on an in-depth interview with each of the four teachers, explores the perceptions of the teachers in terms of their beliefs in translanguaging practice. This study will answer the question: What pedagogical issues can be found based on the four Indonesian EFL teachers' perspectives of translanguaging practice?

In this study, the term L1 is interpreted as Bahasa Indonesia, the national language of the country and the medium of instruction used in schools. Other languages which exist in the teachers' and students' linguistic repertoire are ignored, as both teachers and students may speak different regional languages.

Literature review

Before the 1990s, traditional monolingual ideology has gained momentum in ESL/EFL classrooms (Liu & Fang, 2022; Wei, 2022). Such ideology prohibits the use of students' L1 because of the belief that the use of L1 was detrimental to L2 learning (Wei, 2017). Some studies have reported that there are cases of resistance towards L1 intervention in L2 learning (Creese & Blackledge, 2010; García, 2020; García & Wei, 2014; Rubdy, 2009). Two teaching approaches which were quite popular at the time were Direct Method and Communicative Language Teaching (Emilia & Hamied, 2022). The fundamental principle of the Direct Method is that the way learners learn a new language should be the same as when they learn their first language. In Communicative Language Teaching, the fundamental goal is learners' fluency in the target language, and thus both teachers and learners are required to use the target language (Larsen-Freeman, 2000).

In 1994, Dr Cen Williams introduced the Welsh term *trawsieithu* (Conteh, 2018; García & Lin, 2016) to refer to 'a pedagogical practice where students in bilingual Welsh/English classrooms are asked to alternate languages for receptive or productive use' (García & Lin, 2016, p. 2). In the Welsh educational context, such practice facilitated the use of students' linguistic resources in the Welsh learning process, where both Welsh and English were used (Wei, 2017). The Welsh term was then translated into English as *translanguaging* (Conteh, 2018, p. 445). Since then, many scholars have started to articulate translanguaging practices to replace the monolingual view (Emilia & Hamied, 2022; Sugiharto, 2022). As a result, language practitioners then started to practice translanguaging in their classrooms, in which they allow 'the use of two languages for teaching and learning' (Conteh, 2018, p. 445).

Generally speaking, quite many scholars believe that translanguaging can help teachers reach their primary teaching goals. They viewed translanguaging as a methodological practice which can enhance learning and develop students' cognitive abilities (Baker, 2001; Mickwitz et al., 2021; Putri & Rifai, 2021; Ticheloven et al., 2019; Wei, 2017, 2022), in the sense that by making use of all linguistic resources available, the practice can potentially reinforce students' critical thinking, creativity, and knowledge-building (Creese & Blackledge, 2010; Wei 2017). The fact that there is some kind of flexibility in language use may lead to a dynamic and creative practice (Wei, 2017), which results in a deeper and fuller understanding of the subject matter (Baker, 2001; Sahib et al., 2020).

Apart from the development of learners' cognitive skills, translanguaging is also perceived as a pedagogical approach which could lower learners' effective resistance and support teachers in building rapport with the learners (Yuan & Yang, 2020). In other words, trust between learners and their teachers could be established (Duarte, 2016), and more friendly and engaging activities between them could be created (García & Lin, 2016). Likewise, translanguaging pedagogy was also perceived positively by the students and teachers of Polish EMI (English as a medium of instruction) classrooms in three different schools in Poland (Romanowski, 2020). The findings indicate that both students and teachers found that the approach creates a more flexible learning situation.

Other studies also reported that translanguaging provides ample opportunities for students at a lower proficiency level, especially those who learn the language at adolescent or adult age (Baker, 2001; Khairunnisa & Lukmana, 2020; Yuvayapan, 2019). The translanguaging practice was also perceived as acknowledging the presence of minoritised communities who speak minoritised languages (Cenoz & Gorter, 2020; Flores & García, 2013; Khairunnisa & Lukmana, 2020). In a different context, translanguaging is viewed by Ke and Lin (2017) as a beneficial pedagogical tool in TESOL because, in this globalized community, students are very likely to 'translanguaging in their future workplace and their use of English will not be in a monolingual English environment.'' (p. 41).

However, there are reports about the ineffectiveness of translanguaging practice in EFL classrooms across countries. The Turkish EFL teachers surveyed in Yuvapan's (2019) study, for example, did not show any enthusiasm towards translanguaging pedagogy due to 'the expectations of their institutions, colleagues and parents of their students' (p. 678), in that monolingual norm is believed to enhance the students' English proficiency. Likewise, Fallas-Escobar and Dillard-Paltrineri's (2015) study also indicates that the Spanish EFL teachers and students also considered translanguaging ineffective because the presence of Spanish in the EFL learning process caused the learners' brains 'to become lazy' (p. 312). They further argued that the brain will not get stimulated when learning is not completely conducted in English. In a different context, Schissel et al. (2018) pointed out in their study that some EFL teachers in Mexico believe that translanguaging methodology can help students to acquire L2 competence, but the use of L1 (in this case Spanish) 'is considered a failure because if students are unable to produce a monolingual register of English in particular, teachers fear they will not succeed on the standardized, monolingual tests that are crucial to academic achievement both within and beyond Mexico' (p. 8).

In Hong Kong, a case study by Yuan and Yang (2020) about the perspectives of a Chinese teacher educator reveals that the implementation of a translanguaging strategy in his EMI classes was not well-received by his students due to their doubts and resistance to his attempt to bridge academic theories and practice. In a similar vein, university students and teachers at the University of the Basque Country in Spain also showed more negative rather than positive attitudes towards translanguaging education (Serna-Bermejo & Lasagabaster, 2022).

In the Indonesian context, the translanguaging practice has received different reactions. Generally speaking, both teachers and students reacted positively to translanguaging practice (Berlianti and Pradita, 2021; Emilia & Hamied, 2022; Khairunnisa and Lukmana, 2020; Putri & Rifai, 2021; Raja et al., 2022; Rasman,

2018; Sahib et al, 2020; Sapitri et al., 2018; Saputra, 2020; Saputra and Akib, 2018). However, those who view translanguaging practice negatively commonly believe that L1 intervention would hinder EFL learning, and thus full exposure to English is a must (Carstens, 2016; Renandya & Chang, 2022).

Controversies regarding translanguaging practice in EFL pedagogy have been raised by a number of scholars. For example, in a quite recent article, Liu and Fang (2022) highlights the importance of re-examining the significance of translanguaging practice in English language teaching. They argued,

> […] whilst the stakeholders recognized some pedagogical functions of translanguaging, constraints including monolingual policy and ideology, lack of institution guidance, uncertainty of L1 as resources for subject learning, frequency of L1 use, have prevented translanguaging practices (p. 395).

In other words, although they agreed that monolingual practice is not ideal, they think that there should be an in-depth discussion concerning the implementation of translanguaging in EFL education.

Another scholar who recently also addressed the controversies of translanguaging practice is Renandya and Chang (2022), who raised two intriguing questions: (1) Would translanguaging work in the EFL contexts? (2) Would it help learners develop confidence in using the target language for social and academic communication? The two scholars came up with the following conclusion:

> Hard to say. Research on translanguaging to date seems to be done mostly in non-EFL contexts. In addition, the focus of the research seems to be more on content rather than language learning. Translanguaging research is typically done in EMI (English as the Medium of Instruction) contexts. While there is focus on language, the primary goal of instruction is more on the mastery of course content than language development. A popular approach of CLIL (Content and Language Integrated Learning), where content is presented using simplified language and further supported by the use of visual or graphical information to make the lessons more palatable.
>
> Our thought is that translanguaging is probably more applicable in immersion or semi-immersion contexts (e.g., EMI, CLIL, or other Bilingual programmes) when students already have a certain level of proficiency in two or three languages. In these contexts, allowing students to translanguage when learning content makes a lot of sense.
>
> (https://tesl-ej.org/wordpress/issues/volume26/ej103/ej103a25/)

Translanguaging is meant for pedagogical equipment for an effective learning process. Therefore, controversies about the translanguaging practice will always exist as the success or failure of the practice depends upon many factors, among others, geographical location, learners' social backgrounds, learners' L1, teachers' experience, etc.

Method

This study follows a qualitative case study design. It aims to address the question "What pedagogical issues can be found based on the four Indonesian EFL teachers' perspectives of translanguaging practice?"

Participants

Four Indonesian EFL teachers were interviewed voluntarily through an online communication platform, Zoom. Their teaching experience ranged between 7 to 17 years. All of them have received a CELTA (Certificate of Teaching English to Speakers of Other Languages) from Cambridge. CELTA is a globally recognised English teaching qualification and has been frequently requested by employers. All participants have taught different levels of EFL classrooms, and their students ranged from five-year-old children to adults in their fifties. Two participants represent teachers from formal institutions, while the other two are freelance private teachers. As previously mentioned, even though the teachers and students may speak different local languages, in this study the languages used for translanguaging practice are Bahasa Indonesia and English.

Table 1. Participants

NNESTs	Gender	Age	Ethnic Background	Current Place	Teaching Experience
T1	F	28	Chinese Indonesian	Kediri, East Java	7 years. Freelance private teacher, currently teaching private online/offline classes
T2	F	39	Javanese	Sumba, East Nusa Tenggara	17 years. Currently an EFL teacher in a vocational institution
T3	M	35	Kutainese	Kutai, East Kalimantan	15 years. Currently a lecturer at a private university in Kalimantan
T4	F	38	Chinese Indonesian	Malang, East Java	17 years. Freelance private teacher, currently teaching EFL on an online application

Data collection and data analysis

An in-depth interview method was chosen to explore the four teachers' opinions about the translanguaging practice. Since the teachers live in different places, each of them was interviewed via Zoom application in December 2021. Each interview lasted for about one hour. The interview started with an introduction about themselves. This is the moment for them to share the years they have been in their career. Afterwards, the questions became more specific in exploring their perspectives on translanguaging practices, especially in the Indonesian context.

Once the interview was over, the recording was stored in a well-secured online storage provided by Google One.

The next step was to transcribe the four recordings. After that, the teachers' responses were qualitatively analyzed and categorized into some pedagogical issues which were raised during the interview.

Findings and Discussion

This section analyses and discusses the in-depth interview results from the four teachers' responses. For privacy's sake, their names are replaced with 'T', which stands for 'Teacher', and followed by their turn number. From the interview, we identified four pedagogical issues of translanguaging practice, namely (1) confusion of the concept, (2) institutional policy, (3) cognitive and social gains, and (4) complication.

Confusion of the concept

The first pedagogical issue concerns with the confusion of the concept of translanguaging. The four teachers reacted differently when asked what they believed in the concept of translanguaging. T1, who is a freelancer, expressed that she was more familiar with the term code-switching or code-mixing: "*I'm familiar with the other terms, like code-switching and code-mixing."* T2, an experienced teacher in a vocational school, was somewhat confused about whether there was a difference between translanguaging and being bilingual: *"… what is the difference between translanguaging and bilingual."* On the other hand, T3, who is a university lecturer, is quite familiar with the term: *"Translanguaging, as far as I know, is a pedagogical approach that a teacher uses to teach a new language to students, especially to bilingual students. Translanguaging is, in my perspective, is not only translating."*

In contrast with T3, T4 believed that translanguaging is a translation activity: *"I suppose translanguaging is used when you are not a monolingual, so you may use translation or other words to help the students to understand a word…."* Interestingly, she expressed her pessimistic view that translanguaging is no longer needed in the future: *"Translanguaging is not going to be needed in the future. By that time, many will go to the international schools."* T3, on the other hand, had a different view about the future of translanguaging: *"I think this pedagogical approach has a prospect in the future."*

The teachers' beliefs in translanguaging represent how much they see the prospect of this teaching pedagogy in the future. Of the four teachers, only T3 had a clear understanding of translanguaging. This is most probably due to his educational background. When the data was taken, T3 was doing his postgraduate study in Taiwan. Being a postgraduate student outside the country, he had a positive view of translanguaging in FL learning. However, T2, who is teaching at a vocational school in Sumba – an island in the eastern part of Indonesia – is not familiar with the term. But after the interviewer explained what it was, she immediately expressed her positive view: *"It is beneficial in English language teaching […]. It has prospects, especially when we talk about teaching English in the eastern part of Indonesia".* T2, who has a Javanese background, is quite aware of the fact that teaching English to vocational students is not an easy task, and therefore, the use of L1 – in this case Indonesian – in teaching is unavoidable.

T4 was the only teacher who was against the implementation of translanguaging practice in the EFL classrooms. For her, this pedagogical practice would go downhill along with the increasing use of English in this globalized world, especially by the younger generation. She said, *"To be honest, I don't agree with this. I can simplify my instructions."*

When we observe T4's background as a freelance teacher, we may assume that the choice of using the target language in EFL learning is based on her own belief that learners should predominantly focus on the target language rather than their L1. As a freelancer who has long been used to teaching in a one-to-one setting, T4 has more freedom to decide her techniques for teaching the language. This has probably made her believe in the concept of monolingualism in the EFL context which was quite strong in the 20th century (García, 2009). At that time, popular teaching methods in EFL were Direct Method and Communicative Language Teaching, which require the only use of the target language in the teaching-learning process (Emilia & Hamied, 2022).

Institutional policy

The next pedagogical issue that was addressed by the four teachers is institutional policy. This issue concerns the internal language education policy in some institutions which hinders EFL teachers from implementing translanguaging in their EFL classrooms. T1, a freelance teacher in a non-formal language institution, said:

> *"In a few years of the beginning of my teaching career, I always feel like using English all the time is the key. You have to be a role model to your students, not use the L1 a lot in the classroom. We practise English all the time, then we should use English all the time. […] And of course, there is a policy from the English centres. […] We are not supposed to use two languages in one class. And the language centres always promise one hundred per cent in English environment…"*

T2, who is teaching at a vocational school, did not encounter any problems with the institutional policy. The EFL subject at a vocational school is not taught as one of the main subjects, and therefore, she had more freedom in teaching the subject. However, she found herself in an awkward position when her colleagues underestimate her for her capacity as an English teacher due to the fact that she is not a native speaker of English.

> *"My colleagues seem to underestimate my teaching partner and me because we're Indonesians teaching English. And the fact that we incorporate Bahasa in class even makes them doubt about our teaching methods and professionalism."*

In this case, the comments made by T2's colleagues indicate that there are still some people who believe in native-speakerism, a concept which believes that EFL learners should have a native-speaking model (Lim & Park, 2022). It is even suggested that both foreign and native English teachers ought to have a harmonious relationship which supports fostering a more conducive learning environment for both students and teachers (p. 19).

As for T3, although he did not experience strict regulation to use only English from his institution, he admitted that there are some schools which prohibited the

use of L1 in class: *"Some of the problems may come from, if you talk about the outsiders, or the external causes, such as policy from the schools and the administration."*

T4, a freelance teacher who has been working in a number of English language centres, claimed that although there was no written rule to use full English in the classrooms, she believed in monolingual practice. When students did not understand what she said, she would just simplify her instructions in the English language.

Cognitive and social gains

The second pedagogical issue concerns the cognitive and social gains of translanguaging practice. This issue emerged after an initial discussion about the teachers' philosophy about EFL education. All four teachers showed their commitment to their teaching profession by prioritizing their students' needs above all. The following are their statements.

> "*I always try to make my class comfortable for the students. I don't want them to feel like a burden and make English sound daunting."* (T1)
> "*In my classes, I try to provide a safe environment for students to learn and to make mistakes."* (T2)
> *"... what I have to do is to provide the opportunities to every student in the classroom."* (T3)
> *"I'm just applying what we call student-centred. I've learned that my role is as a facilitator facilitating the students to learn more."* (T4)

As mentioned previously, at the beginning of the interview, T1 and T2 were not quite familiar with the concept of translanguaging although in reality, they have practised a bilingual approach in their EFL classrooms. However, as the interview went on, they became more aware of the concept. So, when asked whether translanguaging could contribute to the success of learning EFL, they responded:

> *"I know it can enhance the students' fluency."* (T1)
> *"... using two languages in a way helps to build this foundation, like step-by-step gradual climb to the English, I think."* (T2)

T3, who is quite familiar with the concept, also stated that this pedagogical tool aims to develop the student's cognitive skills. He said:

> *"... we need to use translanguaging pedagogy to make the students understand very well what we are teaching them. […] it is good for the development of their cognitive abilities."* (T3)

Further, the three teachers mentioned that translanguaging was quite useful for students who encountered problems in understanding a particular concept in the learning process. For T1, the translanguaging technique could encourage students to work together in class:

> *"I think this is one technique I sometimes use to encourage them to do peer feedback or peer teaching. And the result has been quite good. And they feel like they can explain it to their friends. It can also encourage collaboration among them."*

T2, similarly, found that the translanguaging technique helps to develop the student's vocabulary:

> *"... the use of L1 is helpful for the students to understand, which eventually helps them learn English faster. […] using two languages in a way helps to build this foundation, like step-by-step gradual climb to the English, I think."*

As for T3, he was confident that translanguaging is a solution for students who were not at the same pace as the other students in the classroom: He said,

> *"[…] not all students have a similar profile. So how to deal with that? Translanguaging. I cannot use full English, but I try to introduce the concept in English. I also need to give them the freedom to use their mother tongue in their discussions."*
>
> *"I try to show them how our language is different, and this is how Indonesian expresses the context, expressing the time expressions, and this is how English is expressing their time expressions. So you will see the differences."*

Previous studies by Creese and Blackledge (2010), Pacheco and Miller (2015), Yuan and Yang (2020), and Yuvayapan (2019) indicated that allowing the presence of L1 in an EFL classroom, encouraged the students to be more engaged in the classroom activities. Similarly, Emilia and Hamied's (2022) study found that translanguaging benefited students not only cognitively, but also 'socially and psychologically' (p. 47), as students became more active and they were willing to collaborate with their classmates. Furthermore, Omidire and Ayob (2020) found that it develops confidence among students, and they can help each other learn through several languages (Duarte, 2016).

T3 found that students become more active in class: "*I found that more and more students are engaged and also it can help to decrease the problem that might happen in the classroom."* This is in line with Mickwitz et al.'s (2021) claim that translanguaging places students as the centre of attention, in which the teacher actively provides a space for students to communicate and express their ideas. In relation to teaching English to be able to communicate, T1 says:

> *"There are a lot of communication techniques, and it is our task as a teacher to make them feel that language is meant to be for a communicative purpose, not just because you understand certain grammar and then you are a master of that language. It is all for communication, and it is good that you can speak English and Indonesian, so, to give them a bit of motivation, you are doing great at speaking another language. In the real world, it is amazing that you can use both to express yourself."*

As previously mentioned, T4 did not seem to get the idea of translanguaging as a pedagogical concept. Besides that, she consistently disagreed with the implementation of the translanguaging practice. For her, the translanguaging method is the same as the 'translation' approach. When asked whether she could see the benefit of translanguaging or not, she said that 'translation' can only be used in A1-level classes, since the students have limited knowledge of English:

> […] *the benefits are especially for the low levels, let's say in A1 level, they have limited vocabulary and knowledge in English. So, I don't usually give them the translation. I try to dig up from the first, I elicit from them, what is*

> *that in Bahasa? If they can mention, when I say a word, and they say it in Bahasa, then they understand."*

Thus, for T4, using Bahasa Indonesia should come from the students, and not from the teacher. She then continued: *"If we keep on translating everything, from my experience, they didn't learn a lot."* This type of pedagogical issue has been addressed by Raja et al. (2022), who exemplified a teacher in their study who thought that 'translation in an English class' is not a good practice at all (p. 570).

Complication

The last pedagogical issue which emerged from the interview was a complication of translanguaging practice. Two teachers in this study (T1 and T3) had some experience teaching non-native Indonesian speakers. For both of them, teaching non-Indonesian students was quite challenging since they do not speak the students' languages. T1 says,

> *"[…] when I teach Burmese or Thai students, it makes me dive deep into the lesson plan, anticipate what might be the problematic words, vocabs, or expressions, and try to use other words or similar expressions in their language. But it sounds like a lot because I'm not an expert of their language."*

T3, who was doing his postgraduate study in Taiwan, spent some time teaching private English classes to Taiwanese children. He encountered some problems in teaching them because he does not speak Chinese. T3 says,

> *"I don't speak Chinese, and the students don't speak English. So, we don't need it in a certain place, so what I'm trying to do, for example, like I need translanguaging with the help of the parents, with the help of digital apps. Then, some very concepts need to be introduced to the students, and then it is impossible to do the translation because I cannot do that."*

> *"There will be some moments when communication is lost. But I usually predicted it, so I prepared it before I go to the class. For vocabulary building, for example, the vocabulary about verbs, are quite easy to teach coz I can mimic them. But for nouns, I use pictures. The same also happens when he could not say what he wants to say. He drew a picture. But if he's in hurry about what he wants to say, he asked his mom to explain it."*

In this case, T3 facilitated translanguaging practice to the EFL learners, although he did not speak the learners' languages. Allowing them to make use of their home language with their parents, would help them clarify things which are difficult to be understood by the learners.

Another complication expressed by the teachers is that the use of L1 may hinder the students' L2 proficiency since they are more comfortable using L1. T2 and T3 said:

> *[…] the students can get too comfortable, even when they're in higher levels, they use Bahasa just because they're a bit lazy to think or to use English. In a way, it's difficult because I want to encourage them to use English more. They know I'm Indonesian."* [T2]

> *[…] because many students feel very comfortable in L1 and then, it is very nice for the students, in their perspective, teachers will translate everything."* [T3]

What was felt by T2 and T3 indicated that teachers saw that speaking in L1 was very tempting for the students, and this could weaken the students' effort to practice their English and detract them from the communicative language teaching methods (Fallas-Escobar & Dillard-Paltrineri, 2015). In other words, using too much L1 is assumed that it could hinder the students' L2 proficiency.

In another vein, the complication of translanguaging practice for T4 is that students will not make any progress if they are not forced to use English all the time and to think in the language. She said: *"So, if we don't help the students, if you want to produce in English, then speak, write, think in English. How can we think in English if you are not used to it?"* In this case, T4's attitude is similar to the subject in Yuan and Yang's (2020) study which believed that "English should dominate his classroom teaching" (p. 18).

Discussion

Generally speaking, the teachers involved in this study believe that translanguaging practice can empower both teachers and learners cognitively and socially. Cognitively, translanguaging provides more opportunities for learners to understand the concepts faster. Socially, it can build trustworthy relationships between teachers and learners, making learning activities more effective and fun. Making use of translanguaging techniques can avoid silence, as learners can express their ideas in their language when they encounter problems. One teacher was strongly against the translanguaging practice, although she admits that it can be applied to beginners.

In this study, some teachers initially stated that they were not familiar with translanguaging. Although in reality, they did practice translanguaging, this study did not explore too heavily on their teaching experience. However, this study discovers that teachers who are not involved in formal education may have more flexibility in delivering the subject materials and in their mode of interaction with their students. Some complications will appear when they encounter students who get confused because they do not speak a common language with the teachers. Translanguaging may be a solution to overcome the problem, but in this case, teachers' creativity to find a solution is more important. This finding conforms with the students' feeling of confusion in Ticheloven et al.'s (2019) study when students become 'a bit lost between languages (p. 506) because they do not get clarification in their L1 from their teachers. Similar to what T3 did with his students in Taiwan, the teacher in Ticheloven et al.'s (2019) study also suggested that 'parents can get involved' (p. 506) in the learning process.

As shown in previous research (Fallas-Escobar & Dillard-Paltrineri, 2015; Solhi & Büyükyazı, 2011; Yuvayapan, 2019), this study also reveals that monolingual practice is sometimes unavoidable since there is a restriction from stakeholders that 'English only' policy must be consistently applied. The restriction does not only come from the institution, but often times it comes from parents or even the students themselves who insist on maximizing the use of English in the classrooms. This may be due to the fact that the position of English in Indonesia is

not a second language but a foreign language, where students do not have much opportunity to communicate in English outside the classroom.

In this study, the four teachers teach in four different geographical areas in Indonesia. Each teacher faces a typical situation in their EFL classrooms. The freelance teachers are not committed to a particular educational policy and thus they are more flexible in delivering the subject materials. As for the other two teachers who work in formal education, their institutions do not apply strict regulations on the use of English as a medium of instruction. Thus, the issue of whether teachers allow translanguaging or not, as stated by Yuan and Yang (2020), should depend on the 'situated teaching context' (p. 1), where teachers have more opportunities for various teaching options which are suitable for their students. Furthermore, to date, there is no policy from the Indonesian Ministry of Education and Culture about the implementation of EMI (English as a medium of instruction) in EFL classrooms, and thus language practitioners have more flexibility in whether to apply EMI or not. This situation differs from that in Japan, where a policy reform has been implemented by the Japanese Ministry of Education, Culture, Sports, Science and Technology towards 'a predominantly target language (TL)-based classroom environment to maximise students' exposure to English' (Turnbull, 2018, p. 102).

Conclusion

This study is limited to only four individuals who teach in four different geographical locations in Indonesia. It aims to explore the four teachers' perspectives on their beliefs about translanguaging practice in EFL pedagogy. Two teachers are representatives from formal education, while the other two are from informal education settings. From the in-depth interview with them, we drew four pedagogical issues of translanguaging practice in the Indonesian context.

The first pedagogical issue concerns with the confusion of the concept of translanguaging. Of the four teachers, only one teacher was familiar with the concept. The teacher, who taught EFL in formal education and was a postgraduate student in Taiwan when the data was collected, was knowledgeable about the concept and practised it in his EFL classrooms. The other three teachers were not familiar with the practice. One teacher, who is a freelance teacher, was strongly against the pedagogical concept and referred to that practice as a translation activity.

The second issue deals with institutional policy. This issue deals with the internal policy of 'English use only' as a medium of instruction in some institutions. Two teachers who are teaching in non-formal education expressed their experience with some language centres where they used to work. However, when the interview data were taken, actually the four teachers had the freedom to apply translanguaging or not.

The third pedagogical issue is the cognitive and social gains of translanguaging practice. All teachers except one (T4) agreed that translanguaging practice can assist students in understanding the concepts of the English language faster so that they have more opportunities to use their thinking capacity to the maximum. Translanguaging was perceived as a meaningful strategy in this case because communication breakdown is natural, and it should occur in EFL classrooms as part of the learning process.

The last issue addresses the complication of translanguaging practice. Two teachers were presented with students who did not speak Bahasa Indonesia, and

since they did not speak the student's home language, then they should find a way to deliver the teaching materials, such as using pictures and other tools. One teacher gave access to translanguaging practice by asking the student's mom to explain in his home language. Another complication is when teachers had to face students who preferred to use Bahasa Indonesia rather than English in the classrooms, which may hinder L2 learning development/progress.

This case study sheds light on the fact that the implementation of translanguaging practice in the Indonesian context should depend on typical situations in EFL classrooms. Teachers should note that students' diverse backgrounds and needs should be acknowledged, and their efforts in learning should be appreciated. What is more, learners' knowledge of their L1 should also be considered important in the acquisition process of L2. As stated by Wei (2022),

> […] the knowledge already acquired through the learners' first and/or prior learned languages also plays an important role in foreign-language-medium education (p. 172).

Last but not least, teachers' creativity is 'key to education' (Wei, 2022, p. 181). Whether to translanguaging or not to translanguaging, the teaching approach should try to maximize learners' potential, including their L1 knowledge. Future research should involve more teacher participants as well as students from different geographical areas in Indonesia, including those in remote places.

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ISSUES AND CHALLENGES OF TECHNOLOGY USE IN INDONESIAN SCHOOLS: IMPLICATIONS FOR TEACHING AND LEARNING

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Abstract

This paper mainly aims to explore issues and challenges in using technology to support teaching and learning in various schools located on three different islands in Indonesia, such as in Kalimantan, Nusa Tenggara, and Papua islands. The exploration was done through a holistic literature review of 30 national and local newspapers and online articles relevant to the aim of the study. We performed a peer-debriefing activity to present our review analysis to each other, comment on it, and made necessary revisions to our analysis to ensure the credibility of our review. While the results communicated various things, we could highlight some commonalities: unequal distribution of technology support or facilities in schools, creative ways to support teaching and learning practices regardless of the very minimum facilities that schools have, and continuous support from the Indonesian government and private sectors to improve school technology-supported facilities. We then discussed those commonalities in light of the relevant literature and their implications for teaching and learning to benefit school teachers or educational practitioners planning to teach in schools outside Java with minimal technological-related school facilities.

Keywords: English teaching and learning, teachers, technology

Introduction

Technology or electronic tools, software, and hardware intertwined with the Internet used for teaching and learning (Cahyani & Cahyono, 2012; Mali & Timotius, 2018) has been playing an essential role in education worldwide.

Computers and internet technology have been used daily to support students' and teachers' teaching and learning activities (Hafifah & Sulistyo, 2020). The Internet, interactive whiteboards, mobile devices, and computers have increasingly become integral and required components in the teaching and learning process (Richards, 2015). Inevitably, teachers are challenged to explore effective and various ways of integrating technology into their lessons and teaching practices. However, the types of technology tools that teachers have in their classrooms will influence their ability to integrate technology into their teaching and learning practices (Hamilton, 2018). For most schools that provide a satisfactory learning environment for using computers, technology is a necessary part of learning and might students' teaching and learning process (Li & Walsh, 2010). However, how about schools with very minimum technological facilities? In this study, we are interested in further exploring issues and challenges of technology use in Indonesian schools, especially in areas where access to a good internet connection, electricity, and various technological tools are still problematic for schools, teachers, and students. We want to see how teaching and learning practices are delivered to students despite minimum technological-related situations. This study hopes to provide clear realities of technology use in Indonesian schools and districts for teachers and practitioners planning to teach in schools with similar characteristics.

Literature has informed various issues and challenges about using technology to support teaching and learning. In Indonesia, technology facilities seem the become the most common issues that hinder teachers to integrate and fully maximize the potential of technology into their teaching and learning practices (for example, see Fauzan & Pimada, 2018; Hafifah & Sulistyo, 2020; Mali, 2017; Pujiharti et al., 2021; Purwaningsih et al., 2021; Syafrayani et al., 2022). Another issue is related to teachers' lack of training in using technology for teaching and learning purposes, as concerned by some previous researchers (e.g., Haryanto, 2021). This lack of training might be one of the possible reasons why many educators do not have the knowledge and abilities necessary to utilize computers, and they are not excited about integrating computers into their teaching methods (Eisenlauer, 2020). Other issues are related to teachers' unreadiness to move their face-to-face instructions to online delivery mode (Hidayat & Rozak, 2022) and time limitations in preparing learning materials with technology (Ja'ashan, 2020). In this study, we will explore if schools located on three different islands in Indonesia experience the same or different issues and challenges in using technology from those reported by the reviewed literature.

Method

Our study aims to explore issues and challenges in using technology to support teaching and learning in various schools located on three different islands in Indonesia, such as Papua, Kalimantan, and Nusa Tenggara. To achieve this goal, we conducted a holistic literature review (i.e., similar to Li, 2012; Mali & Timotius, 2023) on national and local newspaper and online articles related to the aim of the study and the ones published in the last five years (i.e., 2023-2018).

In finding those articles, we used *Google News* (https://news.google.com/). Then, we typed several keywords, for example, *news Papua Indonesia school technology*, *Papua Indonesia education technology*, *realities of technology use in Papua*, and *the use of technology in Papua education*. Additionally, we visited the

Google search engine and some Indonesian news sites that offer articles in English, including *The Jakarta Post* (https://www.thejakartapost.com/), *Antara News* (https://en.antaranews.com/), and the *Conversations* (https://theconversation.com/id/in-english) where we also used similar keywords to find the related articles. We changed the word *Papua* in the keywords with *Kalimantan* and *Nusa Tenggara* to explore articles that discussed the issues happening in those two islands. Unrelated articles and the ones published before 2018 were excluded from our review. In total, we found 30 articles relevant to our study objective (for details, see Table 1).

We then worked in three different groups to review the articles we found. Group 1 (or authors 2-4) focused on Papua Island, Group 2 (or authors 5-7) focused on Kalimantan, and Group 3 (authors 8-10) focused on East Nusa Tenggara. We underlined all phrases or sentences that discussed any issues and challenges in using technology to support teaching and learning. We then created three different tables to put our review results that readers may access here https://drive.google.com/file/d/18AQy4JuiE06IKsraDERRr_1ju_yqCUFO/view?usp=share_link. We intentionally did not show the tables on this paper because of the word's limitations in the journal.

Table 1. The distribution of the newspaper articles reviewed in this paper

No	Contexts	Authors	Newspaper/ Online Sources
1	Papua	Admin (2022)	West Papua Daily News Update
	Nabire	Cahya (2020)	The Jakarta Post
	Teluk Bintuni	Iswara and Cahya (2020)	The Jakarta Post
	Papua	Nasution (2021)	Antara News
	Mappi Regency	News Desk (2019)	The Jakarta Post
	Papua	Poluan and Hassan (2021)	The Conversation
	Papua	Putri (2022)	Digital Bisa
	Papua	Shofa (2022)	Jakarta Globe
	Papua	Sulaiman (2018)	The Jakarta Post
	West Papua	Utomo (2018)	The Jakarta Post
	West Papua	West Papua Content	West Papua Diary
2	West Kalimantan	Bachyul Jb (2017)	The Jakarta Post
	Central Kalimantan	Danuri, S (2022)	Radar Sampit Jawapos
	Balikpapan	Dian (2023)	Waspada
	West Kotawaringin	Disdikbud Kobar (2022)	Portal Berita Pemerintah Kabupaten Kotawaringin Barat
	Pontianak, West Kalimantan	El Fitra (2020)	The Jakarta Post
	Pontianak, West Kalimantan	Konten Media Partner	Kumparan
	Palangkaraya, Central Kalimantan	Mulang (2022)	Media Center Palangkaraya
	Pontianak, West Kalimantan	Oxtora (2022)	Antara News
	Tarakan, East Kalimantan	Redaksi (2021)	Antara News
	Palangkaraya, Central Kalimantan	Sugianto (2022)	Kalteng Tribun News
	West Kalimantan	Yusra (2023)	Daily Social ID
3	East Nusa Tenggara	Andraningtyas and Ad (2022)	Antara Indonesian News Agency
	East Nusa Tenggara	Andraningtyas and Yumma (2022)	Antara Indonesian News Agency
	East Nusa Tenggara	Anggoro (2021)	Medcom.id

Nusa Alam School in Lombok	Heyward (2021)	The Jakarta Post
Santo Stanislaus junior high school in East Manggarai regency, East Nusa Tenggara	Makur (2020)	The Jakarta Post
Wolo Klibang village in West Adonara district, East Flores, East Nusa Tenggara	News Desk (2020)	The Jakarta Post
Kupang City, East Nusa Tenggara	Fernandez (2022)	VOI ID
Kecil Fatutasu elementary school, North Central Timor Regency, East Nusa Tenggara	Iswara and Cahya (2020)	The Jakarta Post
Batudulang village, Sumbawa regency, West Nusa Tenggara	Septia (2020)	Kompas.com
Folangkai public primary school on Alor Island in East Nusa Tenggara	Siregar (2020)	CNA

To ensure the credibility of our review, we performed a peer debriefing technique similar to what was successfully done by previous researchers (e.g., Mali & Salsbury, 2021; Romios et al., 2020). All authors met face-to-face in a classroom, and each group presented their review results. While the members in each group were presenting, the others listened to the presentation and took notes on some points they were interested in clarifying further or commenting on. We could also ask questions to the presenters, and clarify ideas that the group presented. We then used all the feedback from our peers in that class to make necessary revisions to the review results we presented in this paper.

Findings and Discussion

Findings

We will present the results of our analysis in three different categories: Papua, Kalimantan, and Nusa Tenggara, to provide detailed descriptions of issues and challenges in the use of technology to support teaching and learning in schools located on each island. Afterwards, the results will be discussed in light of relevant literature. Importantly, readers should not generalize the findings presented in the following sections as they were only based on our review of 30 articles (see Table 1) covering only some schools in those three big islands in Indonesia.

Papua

Unequal distribution of quality education, also including technology support or facilities. Utomo (2018) has highlighted different cultural responses from Papuans that might have not only widened the educational gap between Papua and other areas in Indonesia but also slowed any technology integration and educational advancements in Papua. Even the government has admitted the gap, including the higher education in Papua, as reported by Nasution (2021), leading to their low human development index. More particularly, a teacher has shared an open letter pleading with the minister to pay attention to schools in Papua because of the unequal and contrasting quality of education and mentioning that the area is not yet ready for technology-based education (News Desk, 2019). Geographical location, as well as the absence of infrastructure for teaching, including internet access, have been mentioned to be obstacles to education development in Papua (West Papua Content, 2022; Putri, 2022).

Lack of readiness to face remote or digital learning, especially during the pandemic. Admin (2022) has reported the difficulty faced in Papua when they

attempted to go through online learning during the COVID-19 pandemic. Different from some teachers' attempts in other areas in Indonesia, a teacher has been reported to still use printed modules during the pandemic due to the unequal distribution of technology in Papua (Iswara & Cahya, 2020). While TVRI, the Indonesia national television network, has attempted to create an educational program to help learners in their remote learning, the absence of learners' smartphones and reliable internet connection have hindered access to such a TV program. Poluan and Hassan (2021) and Admin (2022) have agreed to look on the bright side of the pandemic: it might boost the use of technology to support education in Papua.

Support from the government or other private institutions to develop education and its technical support. Electricity and internet access have become part of the effort from the Indonesian government to develop the education sector in Papua (West Papua Content, 2022). Sulaiman (2018) has mentioned e-learning among the eight education goals targeted by the government. In addition, Putri (2022) has reported that the Indonesian government has fully supported digital procurement and attempted to develop the teachers' teaching skills through a teacher capacity-building program. TVRI has also attempted to air *Belajar dari Rumah*, an educational program, to help learners get through online learning (Cahya, 2020). Shofa (2022) has mentioned Huawei and its commitment to helping Papua deal with the digital divide and technology talent gap by providing better net connection in Papua.

Kalimantan

Lack of facilities provided in the regions. Some regions in Kalimantan need better telecommunication networks. El Fitra (2020) and Oxtora (2022) reported that elementary school teachers even used radio broadcasts to reach their students in their homes during the pandemic. They mentioned that some areas are categorized as blank spots or areas with no internet connection or even electricity.

Adapting to the use of technology, especially in schools. The Indonesian government collaborates with many companies to train teachers in Kalimantan. In facing the digital era, several companies in Kalimantan are assisting schools in preparing the technology that could assist the students facing the new era of technology (Sugianto, 2022; Disdikbud Kobar, 2022; WaspadaID, 2023; Mulang, 2022). Companies such as mentioned by Konten Media Partner (2023), EPSON Indonesia provides schools with their products to enhance the use of technology in schools and *SekolahPro* with their learning management system that helps schools in providing the newest materials (Yusra, 2023). Moreover, one of the internet providers in Indonesia (Telkomsel) provides training for teachers and students in operating *Microsoft Office 365* (Redaksi, 2021) to face online learning since the pandemic.

The presence of Indigenous schools. In this era of modernization, indigenous schools do not utilize technology in their teaching and learning to preserve their tradition (Danuri, 2022; Bachyul, 2017). They carry out concepts of nature in their curriculum. Surprisingly, one of the indigenous schools is located in the same region as a public school in the digital transformation process, in West Kotaringin, Central Kalimantan.

Nusa Tenggara

The need for adequate internet access and limited availability of technology-supporting devices. Many places in Indonesia faced teaching and learning difficulties admits the Covid-19 pandemic. In Nusa Tenggara islands, students and teachers in remote places often study without an internet connection and the proper tools needed for online learning (News Desk, 2020). Thus, they must think creatively about how teaching and the learning process can happen effectively (Fernandez, 2022; Heyward, 2021). Moreover, Septia (2020) mentioned one of the tools they came up with is using a *handy talky* (henceforth called HT), and even though it is difficult for teachers to teach using HT, they still do it so their students can receive the study materials. Some other teachers have to travel far away to meet their students directly one by one at their homes so that they can deliver learning materials (Iswara & Cahya, 2020; Makur, 2020; Siregar, 2020).

Indonesian government's initiatives to improve digital connectivity and talents in Nusa Tenggara. The Indonesian government has significantly improved digital connectivity in Nusa Tenggara by building *Base Transceiver Station* (henceforth called BTS) and supporting digital talent development through various programs (Anggoro, 2021). The government also works to ensure that students and teachers in the region have access to the Internet and the resources needed to advance their skills in the field of digital technology (Andraningtyas & Yumna, 2022). These efforts are expected to positively impact the region's economic, educational, and social development. In short, the government intends to empower Nusa Tenggara to reach its full potential and be at the forefront of digital innovation in Indonesia by promoting a solid digital infrastructure and developing the skills of its people (Andraningtyas & Yumna, 2022).

Discussion

While the findings communicate various things, we would like to discuss three commonalities related to the issues and challenges of technology use for teaching and learning. First and foremost, in support of Butarbutar's (2023); Fauzan and Pimada's (2018); Habeahan et al.'s (2022) previous research findings, we spotted that lack of supporting technological facilities (i.e., related to the poor internet connection and electricity) were the main issues that hinder the full integration of technology in schools. Second, regardless of the unavailability of technological facilities, school teachers successfully found ways to deliver teaching and learning materials to their students. However, our review results are similar to those of Haryanto's (2021), that many Indonesian teachers still lack training in using technology for teaching and learning purposes. Third, we appreciate all the support both from the Indonesian government and the private sector to improve teaching and learning qualities in those three islands by initiating various educational programs to help learners learn remotely from their homes, offering a learning management system service that helps schools in providing and distributing learning materials to students and providing professional development programs for teachers.

These commonalities and what we found in our review became our starting point to discuss their implications for teaching and learning practices, which should benefit school teachers or educational practitioners planning to teach in schools outside Java with minimal school facilities. Teachers in this twenty-first century

should develop an adaptive or survival pedagogy to face different learning contexts, whether or not enough technological resources are available, and anticipate any uncontrolled conditions, such as pandemics or disasters. This has been highlighted by Butarbutar (2023) when reflecting on the online learning experience during the COVID-19 pandemic.

Second, the school teachers can strategically download videos or movies from the Internet before the class and invite their students to watch them together. If there is no signal, they can still use these videos or movies as a source of language learning inputs and discussion for their students. Through videos or movies, teachers can bring variety and flexibility to the language classroom by extending the range of teaching techniques and resources. The idea of using videos or movies is supported by a study by Otta (2021). He recommended that educators in East Nusa Tenggara create videos or tasks that motivate students to learn from various sources, such as books, newspapers, magazines, radio, or television.

Third, students' parental support and involvement are essential, which includes providing any necessary technology or tools. Therefore, school teachers should communicate effectively with parents to better support their children's learning. This was also proposed by Butarbutar (2023) when discussing digital reading and writing literacy for students.

Fourth, the school teachers can collaborate with local officials to ensure that public spaces, such as community centres or libraries have reliable internet access and are safe, accessible, and conducive to learning. Students can use these spaces to access the materials they need. The government of Indonesia has been investing in improving mobile and internet connectivity by deploying BTS in hundreds of villages in East Nusa Tenggara province (as reported by Anggoro, 2021).

Fifth, teachers' training programs in universities should also design courses that can prepare their students to be pedagogically and mentally ready to teach not only in schools in big cities with complete technology facilities and good internet connection but also in schools in areas where there is no internet connection or even electricity.

Last, we would like to emphasize that technical support and assistance from the government should always be available. One good practical example is when the Indonesian government provided phone/data credit to support distance learning during the COVID-19 pandemic (Adjie, 2020; The Jakarta Post, 2021). Effective online teaching and learning, for example, need a reliable internet connection, and therefore, schools must be ready with the necessary facilities. The collaboration among stakeholders should provide equal access to resources and opportunities for all students to learn with the best and wisest use of technology.

Conclusions

This paper has reviewed 30 articles from various online sources to explore issues and challenges in using technology to support teaching and learning in various schools located on three islands in Indonesia, such as Papua, Kalimantan, and Nusa Tenggara. The lack of supporting technological facilities in schools is the main challenge for teachers in those three islands to integrate technology into their teaching and learning practices fully. However, teachers in those islands keep going with that challenging technological situation. They have tried various creative ways to deliver teaching and learning materials to their students, such as through radio

broadcasts, the use of HT, and even meeting their students one by one to deliver the learning materials. The various types of support from the Indonesian government and the private sector to improve teaching and learning qualities in those three islands seem to help the schools gradually enhance teaching and learning practices in their areas.

With these concluding points, we would like to suggest the following practical recommendations for teaching and learning practices in a teacher preparation program in a higher education context in Indonesia. First, pre-service teachers (PSTs) should learn the pedagogical knowledge of technology integration. Such knowledge is about different techniques and tools to integrate and how to purposefully, contextually, and effectively integrate such technology. Courses and other learning opportunities should therefore be designed to develop PSTs' knowledge of technology integration as well as digital literacy. Further, as reminded by Kuru-Gönen (2019), PSTs should be encouraged to consider their future classroom setting and listen to students' views of technology integration in the classroom. Secondly and more particularly, teachers' teaching practice or practicum program should necessitate appropriate technology integration to give PSTs hands-on experience in utilizing technology. This should also add to PSTs' authentic experiences, one of the six strategies teacher educators used in teacher preparation programs, as proposed by Tondeur et al. (2012) and Tondeur et al. (2019). Next, Schmid et al. (2021) have pointed out the importance of support in technology integration. While technical or non-technical institutional support is essential, PSTs must never ignore any opportunities to learn and collaborate with other educators to develop their competencies as well as strong technology utilization. Teacher preparation programs should therefore promote supportive collaboration and network-building opportunities. PSTs should be encouraged to join online groups, forums, communities and workshops. Further, teacher preparation programs could follow up, integrate, and foster PSTs' reflections on their collaboration and networking experiences in their in-class learning.

In closing, we would like to propose some recommendations for future researchers who wish to follow up on this study. First, our analysis results were only based on online articles. Future researchers may conduct an in-depth interview with school teachers teaching in Papua, Kalimantan, and Nusa Tenggara to confirm or challenge what we present in this paper regarding the issues and challenges of using technology for teaching and learning purposes. Second, it will be fruitful to explore further how teachers can fully maximize the potential of radio broadcasts and/or HT tools to support teaching and learning in schools with very minimal technology facilities. Third, future researchers may investigate how technology might improve educational equity and overcome the barriers addressed in the areas. Fourth, it will be beneficial if future researchers explore the appropriate gadgets which can be used in the areas and how the devices are utilized to improve students' academic performance.

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EXPLORING EDUCATIONAL PATHS: UNVEILING CONTRASTS BETWEEN INDONESIA'S CURRICULUM AND HONG KONG'S CURRICULUM

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Abstract
This study aims to conduct a comparative analysis of the development of Indonesia's curriculum and Hong Kong's curriculum, with a focus on identifying the underlying philosophical values and influences embedded in both educational systems. The research also explores the implications of these curricula on various stakeholders involved in their development and implementation. To achieve these objectives, a synthesis research approach was employed, analyzing a combination of empirical and conceptual papers to draw robust conclusions. The study yielded four key findings that shed light on public opinions, philosophy, goals, and implications of the curricula. Firstly, both the Indonesian curriculum and the Hong Kong curriculum received predominantly positive responses from stakeholders, with minor complaints reported through official surveys. Secondly, the philosophical foundation of the Indonesian curriculum centers around social justice, while the Hong Kong curriculum places a strong emphasis on diversity and inclusivity. Furthermore, both curricula have implicit purposes that can be inferred from the range of topics covered in the respective curriculum guidebooks. Finally, the implementation of these curricula has led stakeholders in each country to issue policies aimed at consolidating their influence. In Hongkong, the promotion of the Chinese-based course serves to strengthen China's power in the field of English education. Conversely, in Indonesia, efforts have been made to preserve the Indonesian language by removing the English subject at the primary level and reducing the time allocation for English in secondary education. This study contributes to a deeper understanding of the development and influences of curricula in Indonesia and Hong Kong, providing valuable insights for policymakers, educators, and researchers.

Keywords: comparative analysis, curriculum, Indonesia, Hongkong

Introduction

In mid-2012, the proposal for Indonesia's 2013 curriculum emerged following prior curriculum development endeavors. The basic constitution governs and oversees the reconstruction of the curriculum, with detailed explanations provided in government regulations. The eight standards that are covered by these regulations include graduate, content, process, assessment, teacher, infrastructure, management, and funding competence standards (Badan Standar Nasional Pendidikan [National Education Standard Board], 2017). It is worth noting that recent curriculum reconstruction efforts have resulted in significant changes in four competencies: achievement, content, process (pedagogy), and assessment competence standards, while the other standards have remained unaltered (Mansur, 2015).

Act No. 20 of 2003, Chapter Ten, establishes a clear framework for amending the curriculum, ensuring its alignment with the basic constitution. The Ministry of Education, as the representative of the government, bears the responsibility of structuring the fundamental framework for the new curriculum. In this process, teachers play essential roles as developers and evaluators within schools (Kementerian Riset Teknologi dan Pendidikan Indonesia [Ministry of Research, Technology, and Higher Education of Indonesia], 2003). However, it is important to note that other stakeholders, including parents, social groups, organizations, business groups, and students, do not directly participate in official curriculum development. Instead, they function as recipients of education (Kemenristekdikti, 2003). When the 2013 curriculum was introduced into the education system, the government opted for a gradual implementation spanning the years 2013, 2014, and 2015. This implementation process was reinforced by teacher education programs, guidebooks designed for both teachers and students, administrative measures, and rigorous monitoring and evaluation procedures (Kementerian Pendidikan dan Kebudayaan [Ministry of Education and Culture], 2012).

Renowned for its exceptional education system, Hong Kong holds a unique status as a special administrative territory within China. It has consistently ranked among the top countries in the OECD education rankings. Influenced by its history as a former colony, Hong Kong's education system exhibits resemblances to the British system. Since its reunification with China in 1997, the education system has undergone significant transformation, blending elements from both the Chinese and British systems (OECD, 2010). Responding to challenges arising from the previous curriculum framework, the education commission implemented a comprehensive reform in 1999, marking a turning point in the educational landscape (OECD, 2010). Over time, the curriculum underwent multiple revisions, progressing from the Learning to Learn curriculum in 2001 to the Key Learning Area curriculum guide introduced in 2017 (Education Bureau, 2017).

In 2015, the Curriculum Development Council (CDC) released the KLA curriculum guide for Primary 1 to Secondary 6 (P1-S6), incorporating updates from the previous framework. The CDC is a diverse body that includes principals, teachers, parents, employers, higher education experts, field specialists, HKEAA commissioners, and representatives from the Education Bureau (CDC, 2017). The Hong Kong Examinations and Assessment Authority (HKEAA) conducts public assessments across all educational levels, comprising representatives from the school sector, higher education sector, government delegations, and business

groups. The previous curriculum framework, developed by the CDC, gathered recommendations from KLA committees. These committees conducted extensive surveys and sought feedback from various stakeholders, including principals, teachers, students, and the general public, in order to propose reforms for the previous curriculum. To facilitate the smooth integration of the new curriculum framework into the education system, the Hong Kong government provides a wealth of curriculum guides and downloadable booklets on its official websites, ensuring easy access for teachers and schools (CDC, 2017).

Based on the discussion above, it is interesting to compare the two curricula and understand the underlying principles, educational philosophies, objectives, and approaches in their development. Thus, the research questions are provided below to guide this study:

1. How do the curricula development of Indonesia's curriculum and Hong Kong's curriculum differ in terms of public opinions, educational philosophies, goals, and approaches?
2. To what extent do the two curricula have implications for different stakeholders involved in the educational systems of Indonesia and Hong Kong?

This study provides a starting point for investigating the similarities and differences between the curricula of Indonesia's Curriculum 2013 and Hong Kong's curriculum. Further research and analysis can delve into specific aspects of the curricula, implementation practices, and their impacts on student outcomes and educational effectiveness.

Method

To address the primary inquiries, this study employs the synthesis research methodology. The decision to utilize this methodology is based on factors such as the research questions, availability of relevant literature, limited scholarly works specifically focused on the subject as a literature review and time constraints. Synthesis research involves integrating and analyzing existing conceptual and empirical studies related to curriculum and its implementation in Indonesia and Hong Kong. This methodology is influenced by the pioneering work of Onwuegbuzie, Leach, and Collins (2011), who propose synthesis research as a way to draw conclusions by combining data from multiple related empirical studies. As this study relies solely on existing literature, issues of validity, reliability, and ethical concerns are not applicable since it involves non-reactive data that does not harm human participants (Gray, 2004; Pole & Morrison, 2003).

For the practical implementation of this methodology, the Monash education library is selected as the primary online database to initiate the search for relevant conceptual and empirical studies. The selection of the Monash Library is based on its reliability, wide range of journal providers, and researchers' accessibility to its database. To refine the search within the Education Monash library, three prominent journal providers—ERIC (Education Resources Information Centre), A+, and Google Scholar—are chosen. These providers are known for their credibility and reputable sources on educational topics. The search process involves using specific keywords such as curriculum, education system, implication, Indonesia, and Hong Kong in each journal provider's search columns. Boolean operators (e.g., OR, AND, and NOT) are used to further narrow down the search results to include the most

relevant materials. Additionally, the quality of the identified journals is carefully evaluated. Once the search for relevant literature is complete, the identified journals are examined, analyzed, and synthesized to draw conclusions, generate new insights, and apply the findings within the context of Indonesia and Hong Kong.

Findings and Discussion

Public opinion on the curricula

The Research and Development Board of the Ministry of Education and Culture conducted surveys in 2014 to gather feedback on the implementation of the curriculum in various provinces. The official report published by the board indicated that the response received from school committees, parents, social figures, lecturers, and heads of foundations was predominantly positive (Sugianto, Sutopo & Nuryanto, 2014). The survey encompassed a wide range of aspects, consisting of nineteen distinct categories. These categories examined various elements such as the background of curriculum 2013, social quality, teacher readiness, principal preparedness, school readiness, curriculum purpose, organizational aspects, ease of learning for students, student emotions, curriculum effectiveness, impact of instructional approaches, student adaptability, influence of teaching methods on teachers, impact on schools, availability of books, infrastructure, teacher ability, student motivation, and the role of school committees (Sugianto, Sutopo & Nuryanto, 2014)

The responses from various stakeholders regarding the items mentioned above can be categorized into five groups: "do not know," "bad," "quite bad," "good," and "very good." The proportion of respondents indicating "do not know" is minimal, while the number of respondents indicating "bad" is moderately significant. Responses indicating "quite bad" are relatively high, while those indicating "good" are substantial. However, responses indicating "very good" are relatively low. Overall, it can be concluded that the public response, from the government's perspective, is generally positive. However, contrasting views exist, such as those expressed by the head of the Child Protection Commission Commissioner of Indonesia, who argues that Curriculum 2013 exhibits bias in its implementation towards teachers (Detik, 2014). Additionally, there are concerns about the complexity of assessment practices, which encompass three dimensions and pose challenges for teachers (Tempo, 2014).

In contrast, an annual survey conducted by the Education Bureau and HKEAA in 2012, 2013, and 2014 aimed to assess public sentiment specifically regarding the implementation of KLACG and ELEKLACH (Legislative Council Panel on Education, 2015). The survey findings revealed predominantly positive responses from various stakeholders, with minimal grievances reported. Notably, approximately 99% of school principals expressed a positive outlook, while around 90% of employers expressed satisfaction with the quality of graduates. Furthermore, over 85% of students' achievements, particularly in English, received favorable recognition. However, feedback was also collected from teachers, students, entire schools, and public assessment authorities. Teachers and students expressed concerns regarding excessive workloads, schools raised issues regarding the extensive range of subjects offered, which complicated catering to diverse learners, and public assessment institutions highlighted concerns regarding the alignment

between subject content and standardized tests (Legislative Council Panel on Education, 2015).

Stated purposes of curricula

It is stated in government regulation number 20 year 2003 that the aim of Curriculum 2013 is to

> *''obtain the purpose of national education, that is national education aims to develop the ability to form character and a national civilization that is dignified and to cultivate the potential of students to be a faithful man to the Almighty God, to be noble, knowledgeable, healthy, skillful, independent, and to be a democratic and responsible citizen''* (BNSP, 2016a, p.1).

To ensure the effectiveness of the national education system, it is crucial to establish a comprehensive framework that encompasses graduate competence, as emphasized by the Ministry of Education and Culture (Kemendikbud, 2012). This framework consists of three primary objectives: attitude, knowledge, and skills, which lay the groundwork for the development of content competence, process competence, and assessment for competence standards (BNSP, 2016d, p.3). Within these competence standards, there are defined criteria and coverage, further categorized into core and basic competencies (BSNP, 2016b). These core and basic competencies represent specific desired outcomes tailored to individual subjects and educational levels. In the case of English education, there is no singular aim or goal; instead, the intended outcomes are presented as a predetermined set of core and basic competencies outlined in government regulation number 24 for both junior and high schools. These competencies serve as a guide to delineate the desired achievements and skills to be developed through English instruction.

In comparison to the curriculum 2013, the English Language Education key learning area curriculum guide (ELEKLACG) provides a clear articulation of the aims, objectives, goals, and intended outcomes. This guide, issued by the Curriculum Development Council (CDC), is designed for primary 1 to secondary 6 (p1-s6). The guide outlines the aims of English education, which include the following objectives: Offering students of English the chance to expand their understanding and familiarity with different cultures, while also providing opportunities for personal and intellectual growth, further education, enjoyment, and employment in an English-speaking environment. Equipping every student with the necessary skills to adapt to the evolving socio-economic requirements driven by advancements in information usage and the creation of materials for purposes such as pleasure, study, and work in the English language (CDC, 2017).

In terms of the learning objectives, the KLACG (Key Learning Area Curriculum Guide) provides a comprehensive breakdown of these objectives across three distinct categories: "language forms and communicative function," "language skills and language development strategies," and "attitudes specific to English language learning" (CDC, 2017, p.18). Each category encompasses specific desired outcomes, ensuring a well-rounded English language education. Under the division of "language forms and communicative functions," the curriculum aims to develop students' proficiency in various text types, expand their vocabulary, and enhance their grasp of language structures and usage. In the realm of language skills, the curriculum emphasizes the cultivation of listening, speaking, reading, and writing

abilities, enabling students to effectively engage with and comprehend the English language. Additionally, the curriculum places significant emphasis on fostering positive attitudes towards English language learning, instilling in students an appreciation for the importance of English as a global language. By delineating these specific objectives within each division, the KLACG ensures a comprehensive and focused approach to English language education, facilitating the holistic development of students' linguistic competence and fostering their enthusiasm for English learning.

When comparing the national aims of Curriculum 2013 and the aim of ELEKLACG, it is more evident to focus on their purposes rather than comparing numerous basic competencies of English with the aim of ELEKLACG. There are similarities between the two curricula in terms of enhancing cultural transfer, promoting intellectual development, and preparing students for adaptability in changing economic conditions. However, there are also differences between the curricula in other aspects. Curriculum 2013 aims to strengthen religious beliefs (in Almighty God), promote a healthy lifestyle, and cultivate democratic citizens. On the other hand, ELEKLACG emphasizes the use of English for work and pleasure, without specifically addressing religious values.

Educational philosophies, cultural norms, and values of curricula

Curriculum development is heavily influenced by educational philosophies, cultural norms, and values, as they form the basis for determining what should be included, what should be achieved, and how the curriculum should be structured. Generally, prevalent educational philosophies worldwide, such as social justice, diversity, and inclusivity, serve as the foundation for curricula (Tedesco & Amadio, 2013). Cultural norms and values, on the other hand, contribute to the hidden curriculum, playing a crucial role in interpersonal communication within the social sphere of education (Çubukçu, 2012).

In the context of Indonesia, social justice is the underlying educational philosophy of the curriculum 2013. It is explicitly stated in the introductory section of the graduate standard competence, emphasizing that national education is built upon five principles and the 1945 Constitution (BSNP, 2016a). One of these principles emphasizes social justice for all Indonesian citizens. However, the reality shows that this principle has yet to be fully realized due to various reasons, including student demographics, limited infrastructure, unqualified teachers, and poverty (Rahman, 2015). Furthermore, the values embedded in curriculum 2013 are outlined in the attitude and skills objectives of the graduate competence standard, encompassing eighteen values (BSNP, 2016a).

Religiosity, honesty, tolerance, discipline, tenacity, creativity, independence, democracy, curiosity, nationalism, patriotic spirit, appreciation of achievement, effective communication and friendliness, peace-loving attitude, social concern, and responsibility are among the values incorporated in the curriculum (BSNP, 2016a). Mahsun (2017) notes that these implicit cultural norms in Curriculum 2013 are reflected in social interactions through the topics covered in the guidebooks. The inclusion of local cultural norms and wisdom in the curriculum has been acknowledged by Tcipto Sumadi, the head of the curriculum and library (Widyanto, 2016). Notably, "honesty" holds particular significance as a fundamental principle

guiding the development of Curriculum 2013, responding to the prevailing cases of corruption and manipulation in Indonesia (Kemendikbud, 2013).

Exploring the updated features within the English Language Key Learning Area (KLA) curriculum provides valuable insights into educational philosophies in Hong Kong. The ELEKLACG curriculum, comprising eight recently updated distinctive features, offers a comprehensive approach. These features include the integration of E-learning, the emphasis on generic skills, the incorporation of educational values, the integration of STEM education and reading across the curriculum, the focused learning and teaching of text grammar, the adoption of assessment as a learning approach, and the provision of inclusive English education for gifted students (Education Bureau, 2017). The pedagogical practices implemented within the curriculum exemplify a strong commitment to embracing learner diversity, with specific support for students with special educational needs (SEN) and a focus on maximizing the potential of gifted students within mainstream English learning environments (CDC, 2017). These features collectively establish the philosophical foundation of ELEKLACG in Hong Kong, emphasizing diversity and inclusivity, setting it apart from the curriculum 2013.

Within the ELEKLACG curriculum, there is a notable focus on fostering positive attitudes and values in English language instruction. The curriculum aims to instill seven core values, including perseverance, respect for others, responsibility, national identity, commitment, integrity, and care for others (CDC, 2017, p.24). Additionally, the ELEKLACG curriculum encompasses implicit cultural norms that reflect a harmonious blend of Chinese culture and influences from Western countries. These cultural norms have emerged as a response to curriculum reforms in Hong Kong following its return to Chinese governance in 2001 (Ho, 2006).

Unstated purposes of curricula

The curriculum 2013 is structured around eight fundamental competence standards, with the graduate competence standard serving as the foundation for the others. The graduate standard encompasses three dimensions: attitude, knowledge, and skills, and encompasses a wide range of intended outcomes across all subjects and levels. While the specific objectives for individual subjects, including English, are not explicitly outlined, we can infer them by examining the graduate standard. For instance, within the first objective of the knowledge section, the intended objective is for students to possess factual, conceptual, procedural, and metacognitive knowledge. This knowledge should be developed to a level that encompasses techniques, specific details, and complex concepts in various areas such as science, technology, art, and literature. Furthermore, students should be able to relate this knowledge to their personal context, including themselves, family, school, society, environment, nation, region, and the international sphere (BSNP, 2016a). By analyzing the graduate standard, we can infer that the curriculum 2013 aims to cultivate a broad and comprehensive knowledge base in English that encompasses various disciplines and their application to real-world contexts. The integration of English within these contexts allows students to develop a deeper understanding and connection to the subject matter, fostering a holistic and meaningful learning experience.

Another objective pertaining to English is focused on skills, where students are expected to demonstrate creative, productive, critical, independent, collaborative, and communicative thinking and actions (BSNP, 2016a, p.8). Although the curriculum 2013 does not explicitly state the importance of teaching English, the use of words like "international" and "communicative" suggests that one of the underlying purposes of the curriculum is to equip students with English language proficiency for international and communicative competitiveness. To uncover more specific unstated purposes of the curriculum 2013 in relation to English lessons, it is possible to examine the core competencies outlined for secondary education. The core competencies serve as the foundation for the range of topics covered in guidebooks. By analyzing the recurring outcomes mentioned in the core competencies for secondary students, certain themes emerge. For instance, the phrase "the use of English in family, schools, daily life, and work environments" is repeatedly emphasized. This implies that the curriculum aims to prepare students to possess strong oral and written English skills in various contexts, indirectly positioning them as agents of economic change through English proficiency.

On the other hand, when it comes to the KLA curriculum, particularly in the realm of English, identifying the underlying intentions of the curriculum is comparatively more straightforward. This is primarily due to the presence of a dedicated curriculum framework guide, along with accompanying booklets and modules specifically designed for English. Within the ELEKLACG, the goals, objectives, desired outcomes, curriculum planning, pedagogical practices, assessment methods, and valuable resources are clearly defined and provided. The English language curriculum aims to achieve two overarching goals. Firstly, it seeks to offer students of English the chance to expand their understanding and familiarity with diverse cultures. Additionally, it provides opportunities for personal and intellectual growth, as well as further studies, enjoyment, and employment in an English-speaking environment. Secondly, the curriculum aims to equip every student with the necessary skills to adapt to evolving socio-economic demands arising from advancements in information usage and the creation of materials for personal enjoyment, study, and professional purposes in the English language (CDC, 2017).

By delving into the appendix and conducting a comparative analysis with the overarching aim, we can uncover the implicit objectives embedded within the ELEKLACG curriculum. Notably, certain topics, such as sports and games, let's go shopping, shapes and numbers, and wonders of nature, are not explicitly stated in the curriculum's aim. However, their inclusion provides valuable insights into the curriculum's underlying intentions. The incorporation of sports and games indicates the purpose of promoting a healthy lifestyle through English education. Likewise, the topic of let's go shopping signifies an aim to introduce English in the context of recreational activities. Furthermore, the inclusion of shapes and numbers implies that the KLA curriculum incorporates basic mathematics education, fostering a well-rounded learning experience. Lastly, the presence of the wonders of nature topic suggests a specific emphasis on environmental education within the KLA curriculum, highlighting the importance of ecological awareness and appreciation.

Broad influences of curricula

It is evident that various factors have influenced the development of Curriculum 2013, including political, economic, and cultural considerations (Nasir, Yawan, & Saifullah, 2022). Political influence can manifest through power dynamics, ideological perspectives, and government policies. An updated government regulation regarding process competence standards exemplifies the impact of politics on the curriculum. This regulation resulted in the removal of English instruction in primary education and a reduction of allocated time for English in secondary education, from four hours to two hours per week (Jpnn, 2017). This policy reflects how political decisions shape the content and emphasis of the curriculum. The Ministry of Education aims to preserve the Indonesian language as a valuable cultural heritage by minimizing the prominence of English in primary education and allocating more time for it in secondary education (Fransiscus, 2015. This policy can be seen as reasonable to some extent, considering the experiences of certain African nations where English has significantly displaced indigenous languages (Tamtam, Gallakher, Olabi, & Naher, 2012). For instance, in Namibia, the introduction of English as a second language led to the loss of ten official languages within a few decades, despite the country initially having hundreds of official languages (Tamtam et al., 2012). Such evidence supports the Ministry of Education's decision to limit the prominence of English as a subject in schools.

When examining the development of the Key Learning Area (KLA) curriculum, particularly the English Language Education Key Learning Area Curriculum Guide (ELEKLACG) in Hong Kong, it is crucial to take into account the historical context of the region. As previously mentioned, Hong Kong's history as a former British colony has had a profound influence on various aspects of life, including education. However, a significant political transition occurred between 1997 and 1999 when Hong Kong was returned to China under the leadership of Prime Minister Deng Xiaoping (OECD, 2010). This political shift had far-reaching implications for both the political and educational landscape of Hong Kong.

The integration of Chinese-based courses into the local curriculum in Hong Kong during this period aimed to strengthen mainland China's influence (Yeung, 2017). This influence is evident in the consistent emphasis on Chinese-based courses in the updated seven goals of learning and the major renewed emphasis (MRE). The first objective among the updated seven learning goals focuses on cultivating informed and responsible citizens with a strong sense of national and global identity. This includes promoting positive values and attitudes, fostering an understanding of Chinese culture, and encouraging respect for societal pluralism (Education Bureau, 2017).

Within the Key Learning Area Curriculum Guide (KLACG), the major renewed emphasis (MRE) specifically highlights three aspects related to Chinese-based courses. These aspects encompass strengthening values of education, such as Moral and Civic Education and Basic Law education, reinforcing the learning of Chinese history and Chinese culture, and enhancing the teaching of Chinese as a second language (Education Bureau, 2017, p.9). It is important to note that these updated features have been integrated into all subjects, including English (CDC, 2000). These facts clearly demonstrate the significant influence exerted by mainland Chinese political power on the development of the 2017 KLACG.

It is crucial to acknowledge that the implementation of the Chinese-based course in Hong Kong is driven by political interests and objectives. The Chinese government seeks to foster a sense of national identity, promote cultural and linguistic transmission, and cultivate a strong national awareness and belonging among the youth of Hong Kong (Yeung, 2017). However, this policy shift has had unintended consequences, diverting the focus of Hong Kong students and creating a distraction from core elective subjects such as science or math. The resulting course overload in Hong Kong has raised concerns among educational experts, as students are compelled to prioritize core subjects at the expense of elective subjects, potentially impacting their readiness for higher education (Yeung, 2017).

Beneficiaries and loses sides of the curriculum changes

This study asserts that the government, certain teachers, and some students are the beneficiaries of curriculum changes. Firstly, the introduction of a new curriculum has become a matter of pride and an annual agenda for administrations. While revising the curriculum is considered necessary to align education with the current needs, it cannot be ignored that the implementation of a new curriculum is seen as a significant achievement for the administration, regardless of the potential disadvantages it may pose for teachers, students, and the general public (Nasir et al., 2022). The process of curriculum reform involves substantial costs, including curriculum development, teacher training, socialization, and procurement of books. Nevertheless, driven by institutional pride and political motivations, curriculum reform is often carried out despite these challenges (Yawan, 2022). Secondly, the Curriculum 2013 provides assistance to some teachers through the provision of related books that offer a variety of activities, instructional guidance, assessment guidelines, and resources, which facilitate classroom instruction. Thirdly, the revised Curriculum 2013 benefits some students as the books are now freely downloadable from the internet, allowing them to save on expenses related to purchasing textbooks.

On the other hand, the Curriculum 2013 can also pose disadvantages for certain parties. Firstly, in terms of assessment practices, teachers face challenges in evaluating students' attitudes, knowledge, and skills simultaneously, which can be problematic for them. Additionally, teachers need to adapt to a new curriculum framework, requiring a shift in their pedagogical approach from the previous curriculum. Secondly, considering the varying levels of prosperity among students based on the island they reside in, the absence of internet access, laptops, and other technology-related factors hinder their access to online resources. This means that the lack of physical books can impede their ability to obtain necessary materials (Yawan, 2022). Lastly, the availability of free online books for the Curriculum 2013 has negative implications for publishers and bookstores, as they lose their market share (Wijaya, 2017).

In contrast to the Curriculum 2013, the English Language KLACG appears to be more comprehensive in terms of curriculum elements, pedagogical practices, assessment methods, and resources. ELEKLACG is a new framework curriculum that encompasses various aspects such as curriculum planning, diverse pedagogical approaches, clear assessment practices, and a wide range of resources (CDC, 2017). However, one aspect that can be criticized in the ELEKLACG is its assessment practices. The Hong Kong government continues to implement standardized tests,

including the Hong Kong Diploma of Secondary Education examination, for all subjects, including English (Baile, 2015). The presence of this high-stakes assessment poses a significant challenge for students and parents, as it heavily influences their future prospects. Moreover, the high suicide rates among students in Hong Kong have been attributed to the pressures of the high-stakes testing system (Erikson, 2016). While this high testing regime may benefit the government in terms of international benchmarks like PISA, it is not a desirable educational system if it comes at the expense of students' well-being.

Future implications

This study argues that the Curriculum 2013 incorporates three pedagogical practices: scientific approach, discovery learning, and project-based learning. These practices serve as the foundation for developing syllabi that teachers use to create their classroom lesson plans. In the context of English teaching, teachers rely on guidebooks that contain teaching instructions and basic competencies to formulate their lesson plans. The guidebooks also offer additional approaches, known as enrichment, which include pre-reading activities, post-reading activities, and personal journal writing (Kemendikbud, 2017). In terms of assessment, the Curriculum 2013 emphasizes authentic assessment, primarily focusing on formative assessment methods such as self-assessment, observation checklists, and project-based assessments. Additionally, internal summative assessments are conducted within schools, often comprising multiple-choice and short-response questions. As for external assessment, the government administers national examinations that consist of both paper-based and computer-based assessments. It is worth noting that approximately 20%-25% of the test items in these examinations are created by teacher organizations (Kemendikbud, 2017). Regarding the assessment of English language skills, the Curriculum 2013 primarily evaluates receptive skills, namely listening and reading comprehension.

ELEKLACG, in terms of pedagogy, encompasses a range of teaching approaches, namely "four key tasks, life-wide learning, task-based, learning and teaching of text grammar, e-learning, learner independence, and meaningful homework" (CDC, 2017, p. 56). These approaches are thoroughly explained and supported with examples of how to implement them in the classroom, utilizing materials found in books, booklets, and modules. The assessment practices in ELEKLACG have undergone an upgrade, transitioning from solely assessing learning to incorporating comprehensive authentic assessment methods, including assessment for learning (formative assessment), assessment as learning (summative assessment), and assessment of learning (standardized tests) (CDC, 2017). This new assessment concept spans across different aspects of the education system. Formative assessment is utilized to support the learning process and encompasses various sources such as formative feedback, paper tests, projects, portfolios, and performance tasks. On the other hand, summative assessments, conducted both internally and publicly, are administered periodically to evaluate students' performance in both receptive knowledge (listening and reading) and productive knowledge (speaking and writing) (CDC, 2017).

Based on our analysis of the pedagogical and assessment practices in the respective curricula, we propose a set of actions that are likely to have implications for the Indonesian education system. Our primary contention is that the pedagogical

and assessment practices in Curriculum 2013 are comparatively simpler when compared to ELEKLACG. As a result, this curriculum tends to display a bias, as the principles, instructions, and examples of pedagogy and assessment are excessively general and simplified. This approach is an effort by the ministry to align the curriculum framework with the unique Indonesian context, considering the vastness of the country and the dispersed nature of teachers and students across different islands. Additionally, the outcomes of a teacher competency examination have revealed that 80% of teachers fail to meet the standard requirements (Franciscus, 2015).

This finding aligns with a 20-year research program in education, which highlighted that the major issues in education revolve not only around classroom size and homework but also pertain to pedagogical practices and the qualifications of teachers (Nasir et al., 2022). As a result, our first proposed reform in Indonesia is to enhance teacher competence standards by improving qualifications and implementing more rigorous teacher recruitment processes. This is crucial because teachers play a pivotal role as key stakeholders in implementing the curriculum within the classroom (Mars & Willits, 2003). Additionally, the cases of Mrs. Oublier described by Cohen (1990) and Brubaker (2010) illustrate the importance of challenging assessments in their respective contexts due to the teachers' high level of qualification. The subsequent step involves establishing institutions that involve multiple stakeholders responsible for curriculum development, student assessment, and soliciting public input. This action aligns with the notion of 21st-century curriculum development, wherein the involvement of numerous stakeholders is paramount.

Lastly, and most importantly, concerning the alignment of curriculum, pedagogy, and assessment, it is crucial to ensure these three elements are harmonized. Standardized testing poses a core challenge in aligning the curriculum with assessment practices (Hammond, 2017). Moreover, standardized tests can hinder teachers from employing productive pedagogy and may inadvertently promote a pedagogy of indifference and poverty (Lingard, 2007). Therefore, to maximize productive pedagogy, pedagogy of difference, and effective teaching, and to create alignment between the curriculum, pedagogy, and assessment in an education system, standardized tests should be abolished in favor of comprehensive authentic assessments.

Conclusion

This study concludes that the adoption of the curriculum in Indonesia and Hong Kong has been met with positive feedback, although there have been some minor complaints identified through official surveys. The philosophical foundations underlying the curricula differ between the two regions. Indonesia emphasizes social justice as the guiding principle for its curriculum, while Hong Kong's curriculum is built upon the principles of diversity and inclusivity. Both curricula have implicit objectives that can be inferred from the topics covered in their respective textbooks. Additionally, the implementation of these curricula has prompted policymakers in each country to issue policies aimed at strengthening their influence. In China, the Chinese-based course is promoted to enhance China's control over English education. On the other hand, in Indonesia, the Indonesian language is prioritized by removing the English subject at the primary level and

reducing the amount of time devoted to English education in secondary schools. This study also suggests that reforming the teacher competence standard, including qualification upgrades and improved recruitment processes, along with establishing institutions involving multiple stakeholders, are essential steps to address the challenges faced by the shift of the curricula.

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CLASTERIZATION OF LECTURER'S PROFILE IN ONLINE LEARNING DURING THE COVID-19 PANDEMIC

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Abstract
The learning process changed from classroom to online learning during the COVID-19 pandemic. One of the things that must be done is to analyze the readiness of lecturers in facing online learning. The purpose of this study is to cluster the profiles of lecturers dealing with online learning. The clustering method uses a Machine Learning approach with the K-means algorithm. Data were taken from 274 lecturers who returned questionnaires during April–June 2022. The questionnaire consisted of 27 questions on a Likert scale (1–4). The Boruta technique is used to determine the five most significant variables (Variable Importance) in the clustering. The results of the clustering show that the lecturers are divided into 2 large groups with the following criteria: focus on learning methods, learning materials, student independence, exploration of new knowledge, and online learning evaluation tools.

Keywords: Boruta, clustering, K-means, online learning, variable importance

Introduction
The COVID-19 pandemic hit and almost paralyzed all countries in almost all aspects of life (Vo & Tran, 2021). To control the spread of COVID-19, the Indonesian government has imposed warnings and prohibitions on leaving the house, working, and going to school. Several new terms have emerged, including "working from home" and "studying from home". In the field of education, the term "e-learning" or "online learning" became well-known to the wider community during the pandemic. With e-learning or online learning, the learning process utilizes information technology in teaching and learning, where learning is managed using an electronic or computer system to support the learning process. It is hoped that the teaching and learning process will not be interrupted due to the existence of a lockdown regulation to keep the COVID-19 virus from spreading more widely (Maatuk et al. 2022).

A shift in the learning paradigm is the challenge that stakeholders in education face. Normally, learning takes place in the classroom, but during a pandemic, learning shifts to online learning using resources supported by information technology and the internet (Turnbull et al., 2021). In Indonesia, this challenge is

getting bigger due to the uneven distribution of technological facilities and the high cost of bandwidth (Al-Ansi et al., 2021). But more than that, the most important thing is the challenges that must be faced by teachers and lecturers in preparing teaching materials for students and how to do a good assessment in the online learning process (Almazova et al., 2020).

Problems with educational media and interactions between students and teachers are another issue that requires addressing. If teachers and students can engage directly in the classroom, then online learning requires that these interactions be altered and new approaches developed to ensure that the teaching and learning process is successful. The Learning Management System (LMS) is a popular online learning tool. As long as the user is connected to the system via the Internet, this system offers a learning platform that can enable interactive learning whenever and wherever the user is. In addition to offering instructional materials, well-designed e-learning platforms frequently make it easier to complete other tasks, including quizzes, written tests, and discussion boards (Dobre, 2015; Cavus, 2015).

Specifically for lecturers, several things must be worked on, and the mindset must be changed if they are conducting online tutoring. Lecturers are senior intellectuals, the key force that determines the quality of learning through guidance, the transmission of ideas, orientation, knowledge, and good life values to students. In addition, it is hoped that lecturers can also motivate themselves and students, bring positive energy to students, and contribute to changes in the learning paradigm if they are associated with changes in the teaching and learning process from a classroom system to online (Guri-Rosenblit, 2018).

Several previous studies that focused on lecturer profiles and relationships with online learning (e-learning) can be mentioned as follows: analysis of readiness and use of technology by lecturers (Sulisworo et al., 2020); readiness of lecturers in implementing synchronous and asynchronous learning systems (Sunarto, 2021); lecturer and student interactions in online learning systems (Davidovitch & Wadmany, 2021); digital literacy issues for lecturers (Guri-Rosenblit, 2018). In general, it can be seen that the role of lecturers as mentors in the learning process is important and therefore must be well-prepared by stakeholders in education (Purbojo, 2018).

The process of online teaching and learning can be argued to have been sparked and accelerated by the COVID-19 pandemic crisis. It is impossible to isolate the impact of the fourth industrial revolution from this online teaching and learning process. This concept is known as "education 4.0" in the educational community (Hussin, 2018). Education is established and developed based on lecturer performance and student perspectives, utilizing data gathered from their everyday teaching and learning activities, which is one of the hallmarks of Education 4.0. Data mining is the practice of processing and analyzing stored data in the realm of information technology to produce knowledge or information (Han et al. 2012). Data mining in education is the analysis of data relevant to the world of education and the application of the findings to inform the development of teaching and learning processes (Cope & Kalantzis, 2016; Suhirman et al., 2014).

The purpose of this study is to analyze the profile of lecturers in dealing with changes in learning methods from classroom learning to online learning. What factors influence the lecturer so that the lecturer is ready to make changes to

learning methods? Lecturer profile analysis is carried out using a Machine Learning approach using the K-means algorithm. Lecturers will be grouped into similar clusters based on the data from the answers to the questionnaires provided. The contribution to be made from the results of this research can be used to guide various stakeholders, such as higher education institutions and policymakers, to be effective and efficient in implementing e-learning.

Method

To analyze and view lecturer profiles based on the lecturer's answers to the questionnaires distributed, there are several methodological steps carried out in this study. In general, these steps can be seen in the following diagram:

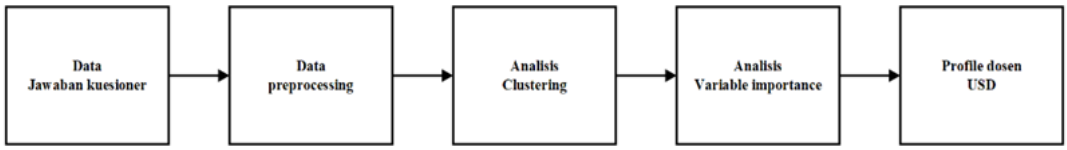

Figure 1. Research methodology

Data is first pre-processed through data transformation, after which it is collected. The Elbow Method and K-means Algorithm are used in the subsequent step of cluster analysis to find the ideal number of clusters. The next step is to identify each cluster's pattern characteristics to collect crucial factors that establish the cluster's uniqueness. The next stage is to evaluate and extrapolate the cluster pattern's characteristics to identify the profile of a lecturer's readiness for the online teaching and learning process.

Data

Data was taken from answers to questionnaires from Sanata Dharma University lecturers that were circulated in April–June 2022. A total of 274 respondents answered a questionnaire about lecturers' readiness to deal with changes in learning methods from classroom learning to online learning due to the COVID-19 pandemic. Questionnaire answers were made on a Likert scale of 1–4, with a value of 1 strongly disagreeing and 4 strongly agreeing. The number of questions is 27, with a focus on student independence, learning materials, learning methods, and exploration of new knowledge. An example of a questionnaire question can be seen in Table 1.

Table 1. Example of the contents of the questionnaire questions

No	Fill in the questionnaire questions
1	I use different methods in online learning compared to offline.
6	I don't need to make many changes in the way I teach for the success of teaching online learning.
11	I provide various lecture materials (text, ppt, video) in the LMS that I use.
17	The quizzes, tests, and assignments that I give are in accordance with the learning objectives and in accordance with the circumstances of students studying online.
22	Online lectures provide me with many possibilities that enrich the way I teach.
24	I don't have any significant problems in operating the LMS to manage lectures.
26	Online learning makes it easier for me to involve students in class discussions.

Data preprocessing

Data taken from real life, such as questionnaire answer data and primary data, where the data is obtained directly from the source, is often inconsistent, noisy, incomplete, and/or missing. So the first step after the data is obtained is pre-processing the data. This data is collected from various sources using data mining or data warehousing techniques.

Data pre-processing entails the procedures we must carry out to alter or encode data so that machines can read it readily (García et al., 2016). In the Knowledge Data Discovery process, data pre-processing is the second step after data collection (see Figure 2). The main idea is that for the model to make predictions accurately and precisely, the algorithm must be able to easily interpret data features.

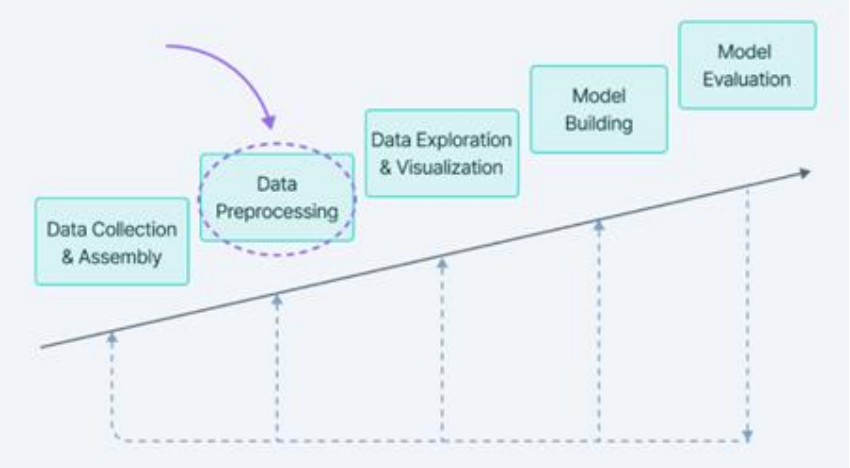

Figure 2. Data Pre-processing in Knowledge Data Discovery

Data mining algorithms cannot effectively find patterns in noisy data; hence, they will not produce high-quality results. As a result, processing data is crucial to raising the level of data quality overall. The data will display erroneous statistical data as a whole if there are gaps or duplicate entries. Similar to outlier data, inconsistent data tends to throw off the learning model as a whole and result in incorrect predictions. In other words, sound judgments must be supported by solid evidence. To obtain data of this caliber, data pre-processing is crucial.

Cluster analysis

Clustering is an unsupervised learning approach used in machine learning and is a widely used method for statistical data analysis in various domains. The process of clustering involves putting data points into groups. We can classify each piece of data into a specific group within a single dataset using a clustering technique (Sarker, 2021).

Theoretically, data points belonging to the same group ought to share similar characteristics, but those belonging to other groups ought to have highly different characteristics. By examining which group is at the center of the data when we use the clustering method, clustering may be utilized in data science to extract certain valuable pattern characteristics from the data. The K-means algorithm is one of the more well-known algorithms.

K-Means algorithm

Probably the most well-known clustering algorithm is K-Means. It is quite simple to comprehend and use this algorithm. To begin, we first decide the classes or groups to employ and then randomly initialize the centers of each group. It is useful to take a cursory look at the data and make an effort to recognize the various categories to determine the appropriate number of classes. The center point, which represents the "X" on the graph we are making, is a vector with the same length as each vector representing a data point (Ghazal, 2021)

Each data point is assigned to the group whose center is closest to it once the distance between it and each group's center has been calculated. The group center is recalculated using these identified locations by averaging all of the vectors inside the group. This process should be repeated several times, or until there is little change in the group's center between iterations. The group center can be randomly selected a few times, and you can then pick the method that produces the greatest outcomes.

Implementing the K-Means algorithm has the benefit of being incredibly quick. Because there are so few computations involved—just calculating the distance between the point and the group's center—the process is quick. K-Means, on the other hand, has several shortcomings. We must first decide how many groups or courses there will be. The K-means algorithm starts with a random selection of cluster centers, which can result in different clustering when running multiple algorithms, making the choice of this class not always simple. As a result, the outcomes could be unpredictable and inconsistent.

Elbow method

The Elbow approach is the most traditional way to determine how many possible clusters are ideal for the dataset under analysis. The fundamental strategy is to choose K = 2 as the initial ideal cluster number K, increase K constantly until it reaches a maximum for the predicted prospective optimal cluster number, and then identify the associated potential optimal cluster number K (Humaira & Rasyidah, 2020).

The Elbow technique examines the relationship between the total WSS and the number of clusters. Additionally, a sufficient number of clusters must be chosen to prevent the addition of another cluster from raising the overall WSS. The following definition of the ideal cluster size applies:

1. Vary k from 1 to 10 clusters to compute a clustering algorithm, such as k-means, for different k values.
2. Determine the total number of squares in the cluster (WSS) for each k.
3. Plot the WSS curve based on the k-cluster count.
4. The number of clusters is often estimated from the position of the elbows in the plot.

Variable importance

In this study, we used the Boruta Technique to conduct a Variable Importance analysis to determine the elements that affect lecturer preparation for online learning. A feature selection technique called Boruta is based on the Random Forest Classifier algorithm. Making copies of features from the original dataset is how the algorithm operates. To create randomness in this copy, the values in each column

are mixed up. Shadow characteristics are the name for these jumbled characteristics. The original features and the shadow features are then combined to create a new feature space with dimensions twice as large as the original dataset.

The algorithm then determines whether the maximum importance of the shadow feature is greater than that of the original feature. The following stage is to build a classification Random Forest on this new feature space to compute a Z-score, a statistical test, to assess its significance. If a characteristic is deemed relevant, it is retained; otherwise, it is eliminated from the dataset. The dataset utilized in the second iteration is created from the features that, in the first iteration, satisfied the requirements. These traits are used again to construct shadow features, and the algorithm assesses their importance as it did in the initial iteration. While certain aspects were eliminated, others were preserved. This continues until a predetermined number of iterations are completed, all features are accepted, or all features are dropped (Naik & Mohan, 2019).

Findings and Discussion

We applied the Elbow method to count the number of clusters. This technique is employed to establish the ideal number of clusters. The Elbow method's findings demonstrate that k = 2, or a cluster of 2, is the best cluster.

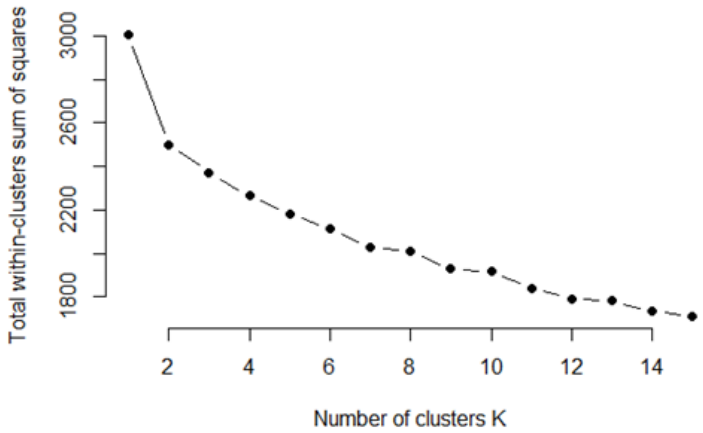

Figure 3. Number of Clusters

To be sure whether it is true that k=2 is the optimal cluster, here is a description of k=2, 3, 4, and 5

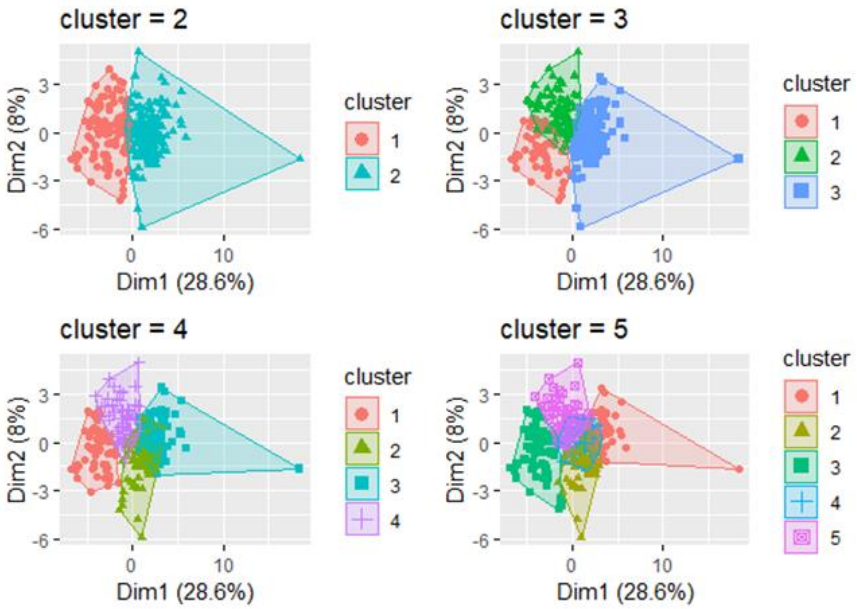

Figure 4. Comparison between clusters 2, 3, 4, and 5

It can be seen that for k = 3, 4, and 5, there is a mix between cluster members. In other words, the cluster does not or cannot differentiate more clearly between members. If k = 2 enlarges the image (Fig. 5), a more definite distinction will be seen between members in cluster 1 and cluster 2.

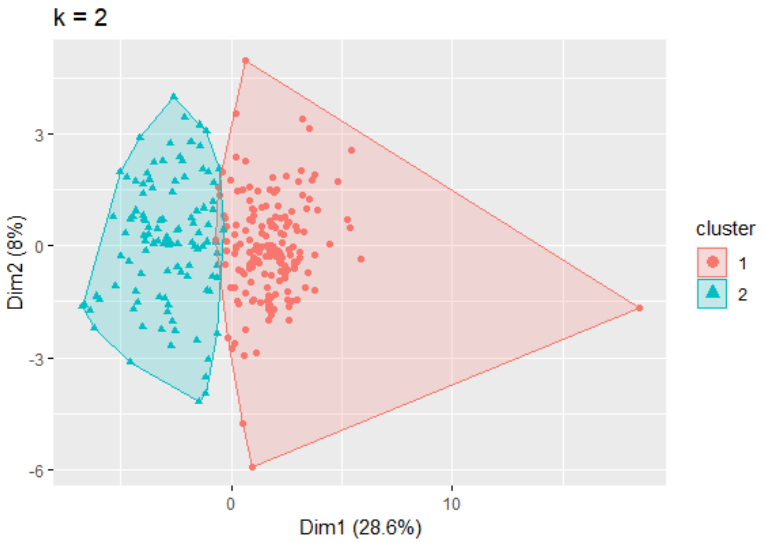

Figure 5. K=2 Cluster with a clearer separation of Cluster Members

To find out what variables have an influence (Variable Importance), the Boruta technique was used in this study. The results of variable importance are as follows:

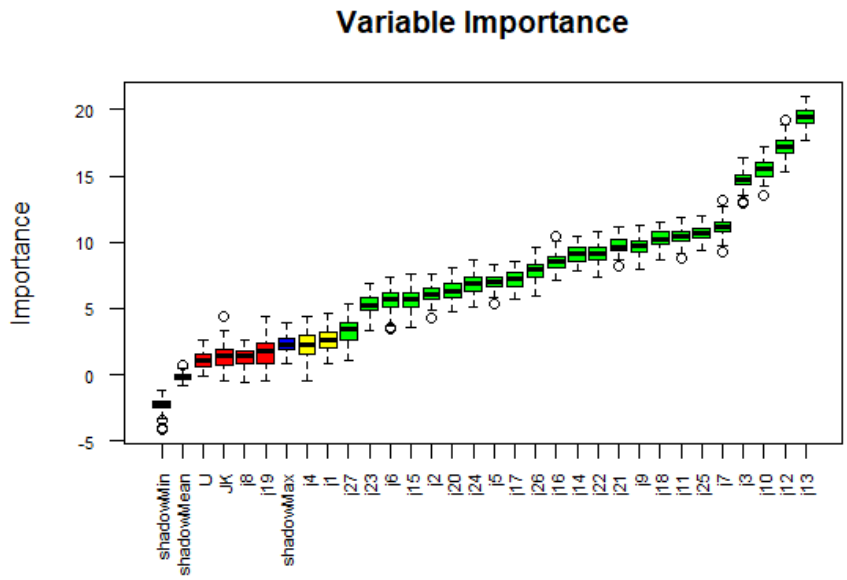

Figure 6. Variable Importance

The green boxplot shows the variables that influence the purpose of the questionnaire. The yellow boxplot is a variable that can be considered an influential variable or not. While the red boxplot is a variable that does not support or has no effect on the intent and purpose of holding the questionnaire.

It can be seen that the order of the top 10 variables of importance can be explained as follows:

Table 2. Variable importance that has the most influence on lecturer readiness in online learning

Ranking	Lecturer Answer
1	(J13) I believe the learning activities that I present in the LMS will make it easier for students to study independently.
2	(J12) The learning materials that I present in my LMS are designed to make it easier for students to study independently.
3	(J10) I give lecture material that I believe is easy for students to learn and master.
4	(J3) I can still teach well and with quality using this online mode.
5	(J7) I explore new knowledge according to my interests during online teaching from home.
6	(J25) In online learning, I can get reference books easily.
7	(J11) I provide various lecture materials (text, ppt, video) in the LMS that I use.
8	(J18) The learning evaluation tool that I gave to students objectively assessed students' abilities according to the learning objectives that had been agreed upon at the beginning of the lecture.
9	(J9) The lectures that I present in the LMS are equipped with clear learning objectives, learning materials, and instructions along with learning activities.
10	(J21) I am more enthusiastic about carrying out this online teaching assignment

Of the 10 Variable Importance, it can be seen that three factors make lecturers ready to carry out online learning. The first factor is that lecturers can present quality learning activities and lecture materials and make it easier for students to study independently (J13, J12, J10, J3). In this case, the instructor modifies face-to-face classroom learning activities into online-learning-appropriate ones. Similarly, lecture content must be adapted for the online learning model. In other words, instructors can adapt learning methods to be more applicable to online education. Additionally, instructors are expected to provide prompt feedback on online assignments so that students know what needs improvement (Suparwito et al., 2021).

Aside from that, activities and materials must be designed to be simple to understand so that students have no trouble with online learning. In its implementation, instructors must foster student well-being. Educational psychology research emphasizes the significance of happiness as a crucial element of educational success (Kislyakov et al., 2014). It is believed that lecturers who foster an atmosphere of openness provide greater opportunities for communication and problem-solving. This type of emotional closeness is the foundation for the development of mutual trust, so students and professors do not feel too far apart. Meaningful feedback will further strengthen a student's closeness and familiarity with the teacher during the implementation phase of learning (Thurlings et al., 2013).

The second factor is that the lecturer explores new knowledge, obtains references, and provides various lecture materials (text, ppt, video) in LMS (J7, J25, J11). The ability and skills of lecturers to teach online are very important to the quality of successful online education (Kim, 2006). This also includes knowledge of online learning tools and features, as well as skills in using them in online learning. Furthermore, lecturers must be able to plan and develop diverse and high-quality lecture materials for online learning (Farmer & Ramsdale, 2016).

The third factor is the ability of lecturers to determine learning evaluation tools to objectively assess students' abilities according to learning objectives (J18, J9). The selection of the right evaluation tool is believed to be able to measure student learning success. There are several ways of evaluating and assessing appropriate online learning in tertiary institutions (Baldwin, 2017)

The study’s findings are consistent with the characteristics of successful online learning supported by various factors, including (Mulyatiningsih et al. 2020): (1) students who can learn independently and have high motivation to learn; (2) lecturers who master online learning technology; (3) learning strategies that provide opportunities for interaction between students, lecturers, and learning content; (4) learning content that is simple and has clear learning instructions; (5) short duration video media, and (6) educational institutions providing learning facilities such as online libraries, LMS, and lecturer training.

On the other hand, there are four variables (J1, J4, J8, and J19) that do not provide significant value for lecturer clustering in adapting online learning. Table 3 below presents four variables that do not contribute to the clustering of lecturers' adaptation to online teaching. In other words, the presence or absence of these variables will not have much effect on the lecturer's ability to teach online.

Table 3. Variable Importance that least influences the readiness of lecturers in online learning

Ranking	Lecturer Answer
1	(J8) I feel more enthusiastic about teaching when I can interact physically with students.
2	(J19) I return work, tests, or feedback within a reasonable time.
3	(J4) I don't need to make many changes in the way I teach for the success of teaching.
4	(J1) I use different methods in online learning compared to offline.

Lecturer profile

Based on the important variable that has been analyzed in this study, the results of a cluster analysis are obtained, which show the profiles of USD lecturers in online learning. There are two groups of first and second-ranking lecturer clusters related to the readiness of lecturers for online learning (see Figure 5). Cluster 1 (red) = 106, with 4 data intersecting with cluster 2 (blue). Cluster 2 (blue) = 168, with 3 data intersecting with cluster 1 (red).

Four main factors influence whether lecturers are included in the ready category in online learning, as follows:

1. Lecturers can provide students with high-quality learning activities and lecture materials, and make it simpler for students to study independently. The lecturer modifies the learning model, activities, and lecture materials to accommodate online learning. In other words, lecturers can adapt offline learning methods so that they are more applicable to online learning, including the ability to provide prompt feedback on online assignments so that students know where they can improve.
2. Lecturers can design material and it is easy to learn so that students have no difficulty in online learning.
3. Lecturers are ready to explore new knowledge, obtain references, and provide various lecture materials (text, ppt, video) in the LMS. In this case, the abilities and skills of the lecturer are needed to learn about online learning tools and features, and how to use them in online learning. Furthermore, lecturers must be able to plan and develop diverse and high-quality lecture materials for online learning.
4. Lecturers can determine learning evaluation tools to objectively assess student abilities according to learning objectives. The selection of the right evaluation tool is believed to be able to measure student learning success.

On the other hand, three main factors influence whether lecturers are included in the category of being less prepared for online learning, namely:

1. Lecturers are used to teaching face-to-face, so they feel more enthusiastic about teaching when they can interact physically with students. This means that lecturers need to find new methods of interaction with students because offline methods cannot be fully used in online methods.
2. Lecturers feel that they do not need to make many changes in the way they teach face-to-face in class compared to online learning. This can mean that lecturers are reluctant to change, in other words, they are reluctant to change methods and create new learning materials. There should be changes in the

way of teaching, activities, and material delivery in online classes compared to offline classes.

3. The lecturer returns the results of work, tests, or feedback in an unreasonable timeframe. It is better that even though the system is online, feedback on online assignments is still given within a reasonable time because students need to know which understanding is correct and what still needs to be improved.

Conclusion

The lecturer profiles were effectively analyzed using a machine learning strategy and the K-means algorithm. By employing the Elbow Method, two clusters of professors are obtained. In addition, a variable importance analysis was conducted to determine the significant factors that determined the lecturers' preparedness for online learning. The first benefit is that instructors can provide students with high-quality learning activities and lecture materials, making it simpler for students to study independently. The second factor is lecturers investigating new information, obtaining references, and providing diverse lecture materials through the LMS. The third factor is the instructor's capacity to determine learning assessment instruments. These three factors can serve as a starting point for stakeholders preparing instructors to provide effective online learning.

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THE ADOPTION OF THE ADDIE MODEL IN DESIGNING AN INSTRUCTIONAL MODULE: THE CASE OF MALAY LANGUAGE REMOVE STUDENTS

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Abstract
This study aims to examine the process involved in designing an instructional module based on the ADDIE model which was developed by Dick & Carey (1996). An instructional module is one of the main tools in the teaching and learning (T&L) process of a subject. Therefore, the design of modules needs to be based on an instructional model that details the phases of the process carefully and systematically. Thus, this study explores the use of the ADDIE model in designing an instructional module for the subject of the Malay language at the remedial level. The ADDIE model consists of five phases: namely analysis, design, development, implementation, and evaluation. The use of the ADDIE model in designing the instructional module has helped in meeting the objectives of teaching and learning as the model uses a systematic approach that fulfills the needs of students. It is hoped that this module can help improve the mastery of basic reading and writing skills for students.

Keywords: instructional module, remedial, remove students, reading, writing

Introduction
Many educators overlook the problem of the mastery of basic reading and writing skills among removed students (students from Chinese and Tamil medium schools who are placed in a transition year to acquire sufficient Bahasa Melayu (hereafter Malay language) proficiency before they are placed in secondary schools). For some, they consider these students to be slow learners who are weak in one or two subjects or certain basic skills. There is a need for a special intervention program to help remove students who have problems mastering basic reading and writing skills in the Malay language. This is because the development of a person's language will directly affect their cognitive ability and subsequently influence their academic performance.

The design of an instructional module is pertinent to the success of the teaching and learning process of a subject. An instructional module is defined as a learning material with detailed teaching practices for the development, evaluation, and maintenance of learning environments that facilitate the learning of a unit of study (Hassan & Rahman, 2011; Ramli & Mahmud, 2006; Richey, 1986;

Shariffudin, 2007). These instructional design models are usually based on learning theories such as behaviorism, cognitivism, and constructivism. This study investigates the effectiveness of an instructional module analyzed using the ADDIE model (Dick & Carey, 1996). It focuses on the instructional module designed for remedial Malay language specifically for remove students at an urban school in Kuala Lumpur. The design of the module is based on theories and models that are suitable for the teaching and learning of the Malay language that help facilitate students to acquire skills, and knowledge and display positive attitudes as well as increase the interest of the students in learning the Malay language. In addition, it is also necessary to recommend optimal teaching methods that can transform knowledge, skills, and students' affectivity (Dick & Reiser, 1989).

Despite the many theories and models proposed by various researchers, the ADDIE model (Dick & Carey, 1996) is used in the design of the module for teaching remedial Malay language to overcome the problem in the mastery of basic reading and writing skills among remove students because the ADDIE model is very thorough and system oriented in producing a good teaching module design. Thus, this study will focus on the process of how the instructional module for remedial Malay language targeted for removing students at an urban school in Kuala Lumpur was designed.

The objective of this study is to explore and discuss the adoption of the ADDIE model in the development of an instructional module for remedial Malay language for removing students. The importance of this study signifies how the ADDIE model is used in designing an instructional module. In addition, it also explains the content of the module aimed at achieving the teaching and learning objectives effectively through a systematic approach in line with the needs of the removed students. Besides, it also will be the basis of further research, especially in the field of teaching Malay as a second language.

This study is confined to the production of an instructional module for teaching remedial Malay language to remove students using the ADDIE model which consists of five phases: namely analysis, design, development, implementation, and evaluation.

Literature Review

The reading skill is dynamic in nature, thus requiring active and meaningful communication between both reader and writer. Understanding what is being read very much depends on a person's knowledge of the language, cognitive style, and reading experience. In addition, the writing ability is a process of channeling information that is mechanical and systematic which further encapsulates the goals, language use, audience, and writing style. Accordingly, the ability to read and write is a basic skill that is significant for effective teaching and learning processes in various disciplines.

Performance achievements and having high ability of reading and writing skills can improve students' proficiency in learning the Malay language as well as other subjects (Jamian, 2011). According to Jamian & Zarin (2008), problems in mastering reading and writing skills cause poor students uninterested in learning the subject of the Malay language. Common reading problems include difficulty in recognizing uppercase and lowercase letters while reading, articulating the correct sound of the words read, and pronouncing the words spelled. A student who does

not master reading skills will also have problems with oral skills (Jamian, 2011; Peng, 2016).

The situation is even more significant in national-type Chinese and national-type Tamil schools where the Malay language is the second language of Chinese and Indian students. The problem of not using the Malay language is unavoidable as these students are not used to speaking in the Malay language before entering primary school. The problems of comprehending and speaking they face justify the fact that they are unaccustomed to a new language. The problems faced by Chinese students in learning the Malay language are noted in a study by Peng and Luck (2009) who found Chinese pupils in the national-type Chinese school failed to master the pronunciation and writing in the Malay language. The inability to read certainly affects their interest to learn the language, especially when Chinese students believe that the Malay language is not an easy subject to study (Ibrahim & Mahamod, 2017; Jamian, 2011).

Nevertheless, the study conducted by Jamian (2011) shows that problems associated with reading skills can be mitigated by planning interesting and conducive instructional activities by teachers. In addition, a comfortable learning environment, motivation, and encouragement from teachers as well as continuous reading practice can also improve students' reading skills. The results of this study found that additional reading exercises can improve students' reading skills and drills that are conducted regularly in reading can help with the pronunciation and fluency of students in reading. In addition, encouragement from teachers and the use of relevant teaching aids can make the atmosphere of reading activities more effective and meaningful to students. The selection of appropriate teaching and learning methods and techniques for remedial reading and writing which meet the needs of the students is very important since it can make it easier for students to understand and master the skills taught. Drills or repeated exercises can strengthen students' memory and understanding of these skills.

The effectiveness of the ADDIE model has been proven in developing effective and engaging teaching modules. In a study conducted by Lee (2006) adopting the ADDIE model in analyzing the needs and interests of students, the model was identified as very effective and efficient in attracting students and motivating students in their learning.

Method

The study explores the development of a Malay Language instructional module for remedial students. The research team involves six lecturers from a teacher education institute in Kuala Lumpur and eight teachers from a target urban school. The research team conducted several series of discussions briefs, and workshops to develop the module grounded in the ADDIE model (Dick & Carey, 1996; White & Marsh, 2006) over a period of five months. According to them, instructional design is a systematic process to design, develop, implement, and evaluate instructions. In education, instructional design is a systematic approach that uses technology to enhance students to achieve desired learning outcomes. The focus of the instructional design is to produce competent and effective instructions which will enable students to obtain the skills, knowledge, and desired attitudes.

The ADDIE model was adopted in developing the remedial instructional Malay language module because it is a generic model that aids in the development

of other models. The model is highly reliable as it grounds many other instructional models which use all five elements in the ADDIE model: analysis, design, development, implementation, and evaluation (Larson & Lockee, 2014; McKenney & Reeves, 2012; Morrison, Ross & Kemp, 2007).

Findings and discussion

The ADDIE model is mainly grounded in the behaviorism theory, an idea developed by Dick and Carry (1996) for developing learning systems. The term ADDIE is an acronym for Analysis (analysis), Design (design), Development (development), Implementation (implementation), and Evaluation (evaluation). From the acronym ADDIE, it's noted that the model applies five levels or elements of interrelated activities which propel the practice of developing teaching programs or teaching modules. Each of these elements or levels does not essentially follow a progressive pattern. Rather, the element or level informs one another in a design system.

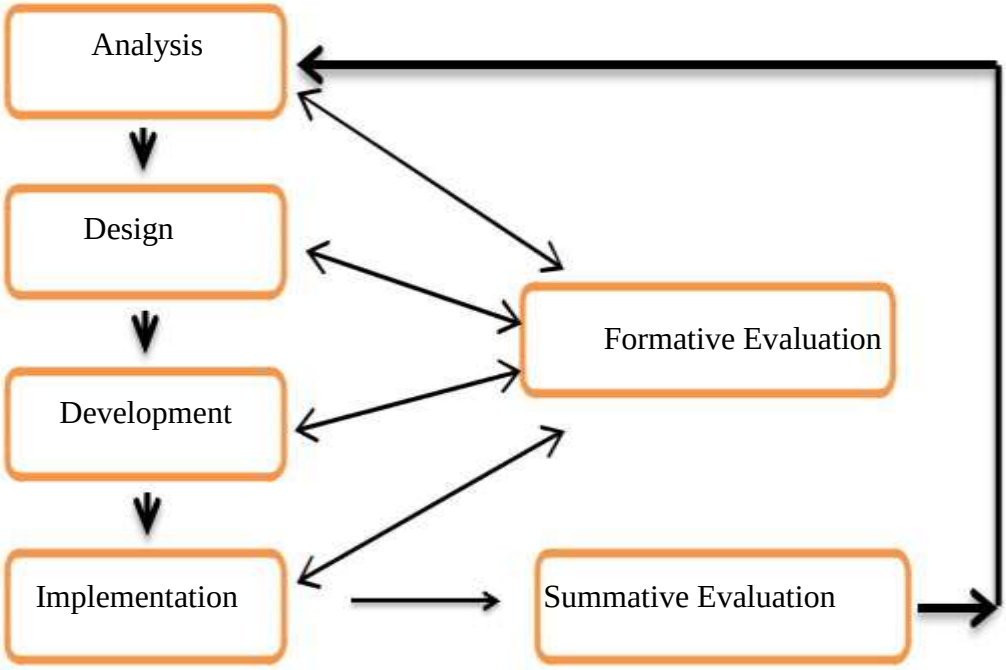

Figure 1. The process of developing a teaching module according to the ADDIE model (Dick & Carry, 1996)

Figure 1 describes the process of designing an instructional module based on the ADDIE Model (Dick & Carry, 1996). It clearly shows that the ADDIE model outlines a comprehensive process of instructional design activities and this is an advantage of the ADDIE model over other models.

Analysis

The analytical stage is the basis for all other stages in instructional design aimed at identifying objectives, content, suitability of targets, and achievable teaching and learning models (Gustafson & Branch, 2007; Larson & Lockee, 2014; McKenney & Reeves, 2012; Morrison, Ross & Kemp, 2017). At this stage, several

analyses are conducted, and among the most important is the identification of problems. The purpose of this process is to ensure that the instructional design produced meets the actual needs of the students. Related problems can be identified through various methods or techniques such as interviews, observations, surveys, questionnaires, and so on.

In summary, in the context of the current study, the analysis process involved three main aspects:

1. Analysis of students
2. Analysis of the learning environment
3. Analysis to identify teaching goals

In obtaining information related to these three main aspects, the key questions that can be asked during the analysis process are:

1. Who are the students who will be involved in the use of the module?
2. What is the student's background knowledge of the Malay language?
3. To what extent is their proficiency in languages other than the Malay language?
4. What is their interest in studying languages other than the Malay language?
5. What are the skills required to meet their interests and needs in the Malay language?
6. What are the materials that are appropriate to be used in grasping Malay language skills?
7. What effective form of teaching methodology is required to deliver teaching modules for the remedial Malay language?
8. What forms of assessment test skills are learned for the remedial Malay language?
9. What are the other problems that can interfere with and affect the process of teaching and learning in achieving the goals and objectives of the module?

These are some of the important questions that need to be answered in the initial stage of the study. All outputs for this phase will be inputs for the design phase and beyond.

Design

Design is the second phase in designing lessons according to the ADDIE module. This second phase aims to determine and design the instructional methods to be used. In this study, this phase addresses the issues raised by the analysis phase. After identifying the general goals of teaching and analyzing student information, more specific learning objectives need to be constructed to explain in more detail the researcher's expectations of the student's knowledge and abilities. Among the elements of this stage are constructing learning objectives and defining the teaching and learning model. The findings of this phase become input for the third stage, which is development.

To construct learning objectives, each focus from the analysis stages is converted into the learning objectives of the activity designed. The method of research and development in the model is determined by exploring cooperative learning methods, problem-solving, games, simulations, discussions, exercises, tutorials, demonstrations, or presentations. Tools and teaching aids used are also

determined in this stage such as using audio, video, computer, internet, and existing or concrete materials. In this study, some of the principles of learning theories based on Piaget's theory of cognitive development, Vygotsky's sociocultural theory, and Froebel's play theory determined the methods used in the teaching module. The pertinent principles of the teaching and learning session are shown in Table 1 on the following page:

Table 1. Teaching and learning principles of remedial Malay language for Remove students

No.	Subject	Principle
1.	Students	1. Each student is unique and has potential 2. Active involvement of students 3. Freedom of choosing materials 4. Equality in obtaining knowledge 5. Planning of individual learning
2.	Parents	1. Involvement of parents and family 2. Inclusion of reading environment in the home 3. Daily reading routine
3.	Teacher	1. Integrated approach 2. Fun learning 3. Learning through play 4. Encouraging creativity 5. Continuous assessment 6. A balance between assisted learning and exploration 7. Room for the enrichment and early remedial needs 8. Multiple media usage. 9. Multiple learning techniques 10. Starts with existing knowledge and continues.
4.	Environment	1. Guarantees students' well-being for acceptance 2. Fun and stimulating environment 3. Adults as role models 4. Appreciating multiculturalism 5. A conducive learning environment that supports the curriculum 6. Life-long internalization of the Malay language

Development

The developmental stage refers to the provision of learning to transition pupils to achieve the learning objectives set at the design stage. This stage involves the construction of learning plans, teaching aids, and supporting documents. In this study, the teaching module included an activity execution plan (AEP) for each focal component of remedial Malay language (the alphabet, vowels, syllables, words, and simple sentences) involving reading and writing skills.

To design the AEP, the researchers collaborated with teachers who taught the subject in a particular school. This ensures the development of the modules is accurate and of quality because these teachers are knowledgeable and experienced in the field of language. Each member of the research group is divided into 6 groups according to predetermined skills that were derived through a series of discussions, briefs, and workshops that lasted for five months in the development of teaching modules remedial Malay language more systematic and comprehensive.

Implementation

The implementation stage refers to the actual delivery of the teaching and learning model (TaLM) which is carried out effectively and efficiently either in the classroom, laboratory, or via computer. Usually, if the planning is good during the analysis, design, and development stages, the implementation stage of the TaLM should run smoothly and can motivate students. On the other hand, the implementation of the TaLM is unsuccessful when students do not understand, are not enthusiastic, and are not involved in the learning process. This happens when the material is too challenging or too easy for students which either could demotivate or bore them.

Evaluation

The evaluation stage measures the effectiveness of the execution of TaLM from one stage to another. This stage consists of two types of assessment, namely formative assessment and summative assessment. A formative assessment was conducted during a specific stage and from one stage to another. The purpose of formative evaluation is to increase and improve the level of effectiveness of the TaLM which has been designed before the actual implementation of the final version. In this study, formative evaluation was conducted through content validity for the analysis, design, development, and implementation stages.

Content validity refers to the extent to which an instrument or module can collect data that covers the content of a field under study (Piaw, 2006). To improve the validity of the content of a module, researchers need to obtain views and feedback from external evaluators or expert services. The role of the external evaluator is to evaluate and ensure that the domains contained in a module represent the field of study. Thus, researchers have gained insights and feedback from three external reviewers who are experienced experts in the field of remedial Malay.

Conclusion

The development of teaching modules in Malay is relevant to support and complement the existing curriculum to remove students who are in a transition period. This study has shown that the ADDIE Model is a good framework in designing effective TaLM. Its efficacy in embracing various elements of an effective TaLM supports motivation among the removed students. In addition, the module can be used as the main support for teachers to teach students to read and write more efficiently and optimally. The production of such modules also concurs with Davis' (2014) assertion that educators' teaching requirements can be supported through training, material assistance, and positive experiences with students. This coincides with Lovelace's postulation (2010) that educators need to modify teaching strategies to suit the individual needs of students.

Overall, the development of teaching modules for remedial Malay language is completer and more systematic through the adoption of the ADDIE model at all levels, namely; (i) Analysis; (ii) Design; (iii) Development; (iv) Implementation; and (v) Evaluation. Further research can be conducted on the production of Malay language materials that support the TaLM. In addition, similar research can be conducted on a larger population to yield a better understanding of its efficacy.

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IMPROVING STUDENT LEARNING INDEPENDENCE THROUGH A PROJECT-BASED LEARNING MODEL: A CASE STUDY ON CREATING HERBARIUM NAME CARD PRODUCTS

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Abstract
The independence of student learning is a crucial factor in determining the success of students' educational journey. However, it is evident that many students still need to develop greater independence in their learning process. This research aims to assess the effectiveness of the project-based learning (PjBL) model in enhancing student learning independence (SLI). The study follows a quantitative research approach, employing a quasi-experimental method. The research design utilized a pretest-posttest group design. The participants in this study were students from year seven, specifically class B and D of LHI Islamic Junior High School during the first semester of the academic year 2022/2023. The selection process involved the use of the classroom random sampling technique. The findings indicate that implementing the PjBL model, specifically through a herbarium project in science learning, resulted in an improvement in SLI. This was primarily due to the requirement of independent work in completing individual projects. Moreover, future endeavors should consider incorporating additional activities that foster collaboration among students, allowing them to balance independence and teamwork in project completion.

Keywords: herbarium, independent learning, PjBL

Introduction
The learning process is an important aspect of education (Sayekti et al., 2019). Learning science is inseparable from the dimensions of skill acquisition, the mastery of scientific products, and the development of a scientific attitude (Aisah, 2020). To ensure effective learning of science, it is necessary to engage in the scientific process, which involves conducting experiments, generating scientific products, and cultivating the appropriate attitude (Sulthon, 2017). Furthermore, science learning should be connected to the everyday lives of learners, enabling them to perceive science as relevant and applicable to their daily experiences (Rohandi, 2017); (Syafiani, 2017). Engaging in observation and research-oriented

science learning allows students to explore scientific concepts, making the process of learning science enjoyable (Sulthon, 2017); (Ma et al., 2014).

One of the expected outcomes in science learning is the development of student learning independence (SLI) (Aulia et al., 2019). It is crucial for educators to have a deep understanding of SLI in order to design appropriate learning activities that can yield optimal results (Suharto Linuwih, 2015). Independent learning is a self-directed activity where children take the initiative, demonstrate willpower, and assume responsibility for completing their tasks (Laksana & Hadijah, 2019); (Aini & Taman, 2012), and do not rely on others (Isnaeni et al., 2018). Learning independence enables learners to acquire 21st-century skills such as critical and creative thinking, communication collaboration skill, and literacy authorization (Astriani & Widjaja, 2020). Indicators of learning independence include self-confidence, active learning, learning discipline, and responsibility (Rahayu et al., 2020).

The reality is that SLI remains low (Afandi, 2013); (Gusnita et al., 2021), especially in the context of post-pandemic learning (Nurjanah et al., 2022); (Yahya & Warmi, 2021). One of the causes of low learning independence is the lack of learning experiences that engage and activate students (Rizkianingsih et al., 2013).

Based on interviews conducted with science teachers at middle schools in Yogyakarta, it was observed that students exhibited low motivation in their learning process. Furthermore, students need to develop more confidence in expressing their opinions. In addition, student responsibility appears to be lacking when assigned group learning tasks. As a result, there is a pressing need for innovative teaching methods that facilitate effective educator-student interactions and enhance students' abilities, all while fostering a sense of independence among learners.

The Project-based Learning (PjBL) model fosters constructivist and collaborative learning approaches. This student-centered model places emphasis on collaboration among students to solve problems and construct knowledge collectively. It promotes an environment where students can learn from one another and actively participate in the learning process (Whatley, 2012). PjBL is an instructional approach that engages students in problem-solving activities through carefully designed projects. By actively participating in these projects, students have the opportunity to construct knowledge and create valuable outputs (Mayuni et al., 2019). The syntax of PjBL includes analyzing problems, creating plans, developing project completion schedules, monitoring project progress, and submitting the final project results (Cholifah et al., 2019).

PjBL is effective in enhancing SLI (Martiani, 2021). Moreover, it has been proven that creating science demonstrations, which is a form of PjBL, can invigorate classroom dynamics and foster stronger connections between teachers and students (Widiyatmoko & Pamelasari, 2012).

One of the suitable science learning topics for year seven, which can be effectively taught using the PjBL model, is the classification of living things. The objective of this topic is to enable students to identify the characteristics of living things and classify them accordingly. The classification of living things falls under the category of theoretical knowledge. By implementing the PjBL approach, it is anticipated that the learning experience will become more meaningful and engaging (Setyowati & Mawardi, 2018) because students engage in meaningful activities that go beyond mere theory memorization.

Therefore, in this study, there is a significant requirement to implement the PjBL model in the science learning material focusing on the "Classification of Living Things." It is anticipated that the adoption of this model will lead to an improvement in SLI.

Method

This research utilized a quantitative approach employing a quasi-experimental research method. The design of this study aimed to create a more natural setting, as opposed to a laboratory-based manipulation, which means that not all variables could be controlled or manipulated (Cohen et al., 2007). This research utilized a pretest and posttest group design with one research class. Initially, students underwent a pretest to assess their baseline levels of learning independence. Subsequently, the students received the treatment, which involved learning using the PjBL model. Following the treatment, a posttest was administered to evaluate any changes in the SLI scores. The pretest and posttest assessments were conducted to compare the students' learning independence levels before and after the implementation of the treatment. This research design is illustrated in Figure 1.

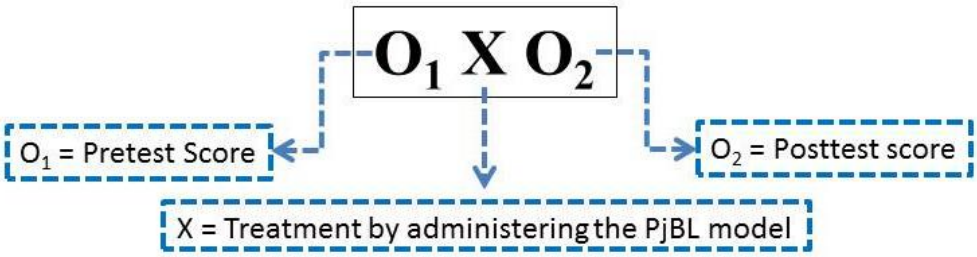

Figure 1. One group pretest posttest research design

This research focused on the topic of "Classification of Living Things." Its objective was to examine the potential increase in SLI through the implementation of the PjBL model. The target population for this study comprised year seven students at LHI Islamic Junior High School during the academic year 2022/2023, involving two classes. The research sample consisted of 33 students from classes VII B and VIID, selected using a cluster random sampling technique.

This study employs two independent variables, namely the PjBL learning model, as treatments given to students, and SLI as the dependent variable. The learning process with the PjBL model is conducted over four sessions.

Observation sheets and Google Form questionnaires were utilized as instruments in this study. The observation sheets consisted of two types: one for assessing the implementation of learning with the PjBL model and another for evaluating student learning independence (SLI). The observation sheet for the PjBL model ensured that all aspects of the model's syntax were properly implemented during the learning process. On the other hand, the Google Form questionnaires were employed to gather data on students' perceptions of PjBL, SLI, and additional relevant information. The recorded data from the observation sheet for the implementation of the PjBL process can be found in Table 1, while the data from the SLI observation sheet can be found in Table 2.

Table 1. Observation sheet on the implementation of the PjBL learning model

No.	PjBL Syntax	Item Number
1	Analyze and solve problems	1,2,3
2	Create a problem solving plan	4,5
3	Develop a project completion schedule	6,7,8
4	project monitoring	9,10
5	delivery of the final results of the project task	11,12

SLI observation sheets are utilized to gather data on students' learning independence. These observation sheets consist of ten statements that are observed throughout the learning process. The instructor observes SLI while they engage in learning activities. This observation is conducted in two conditions: before the application of the PjBL model (pretest) and during learning with the PjBL model.

Table 2. Observation sheets for SLI

No.	Indicator	Item Number
1	Self-confident	1,2
2	Learning Activeness	3,4,5
3	Study Discipline	6,7
4	Responsibility	8,9,10

Data analysis was conducted using the normality test and paired t-test, with the assistance of SPSS software for scientific processing. Prior to conducting the t-paired test to validate the hypothesis, a normality test was performed as a prerequisite. This test aimed to determine if the distribution of group data was normal. The data is considered normal if, at a significance level of 5% (0.05), the sig. > 0.05. If the normality test requirements were met, the analysis proceeded with the t-paired test.

T-paired t-test analysis was conducted on the scores of SLI before and after implementing the PjBL treatment model. The hypothesis for this analysis is as follows.

H_0 = there is no difference in SLI before and after being given treatment with the PjBL model treatment.

H_a = there are differences in SLI before and after being given treatment with the PjBL model treatment.

The significance level chosen for the t-paired test analysis in this data analysis was 5% (0.05), corresponding to a 95% confidence level, adhering to the research standards in the field of education. It is considered that there is a significant difference in SLI before and after the implementation of the PjBL treatment model if the results of the paired t-test analysis indicate a p-value of less than 0.05 or if the calculated t-value is greater than the critical t-value from the t-table.

Findings and Discussion

This study aimed to enhance SLI through a project-based activity of creating herbarium-based name cards. The research was carried out at LHI Islamic Junior High School, specifically with the year VII students, during the odd semester of the academic year 2022/2023. The study focused on students from class B and D, with a total of 33 participants.

The teacher organized the students into groups for the implementation of learning with the PjBL model. Each group comprised 4 to 5 students. The teacher randomly assigned the students to groups to ensure variations in terms of academic performance and character among the groups. The groups were identified by assigning numbers 1 to 4. However, during the initial stages of the learning process, it was observed that students often forgot their group members and their respective group numbers when asked to gather in their groups.

The subsequent step involved assigning names to the groups based on the Latin names of plants found in the vicinity of the school. The group names chosen were *Triphasia trifoliata*, *Phyllanthus reticulatus*, *Rosa centifolia*, and *Moringa oleifera*. The selection of plant names was made by the teacher, taking into account the different types of plants present in the school's surrounding environment. Furthermore, the teacher emphasized the selection of plants with small leaves to ensure they would fit on a herbarium card. Once the problem-solving plan had been prepared as a herbarium card, the subsequent step involved developing a project completion schedule. The project completion schedule is detailed in Table 3.

Table 3. Project completion schedule

No.	Activities	Completion Time
1	Looking for one type of plant to be used as a group name	1 hour lesson August 2022 fourth week
2	Drying the leaves of the plant for one week	1 week between the fourth week of August 2022 to the first week of September 2022
3	Preparing the cards that will be used to attach the herbarium leaves	1 hour September 2022 first week
4	Writing down the name of the group and stick herbarium leaves on the card	1 hour September 2022 first week
5	Laminating the cards	1 hour September 2022 first week

The steps that had been implemented in the implementation of learning included: a. determine student groups with code numbers 1-4, b. the group is looking for a plant to be used as a group name, c. the group dried the plant leaves for one week, d. the group writes the group name and attaches herbarium leaves to the card, e. name card laminating group, f. groups use name cards in science learning activities. The detail process of making herbarium-based name cards is shown in Figure 2.

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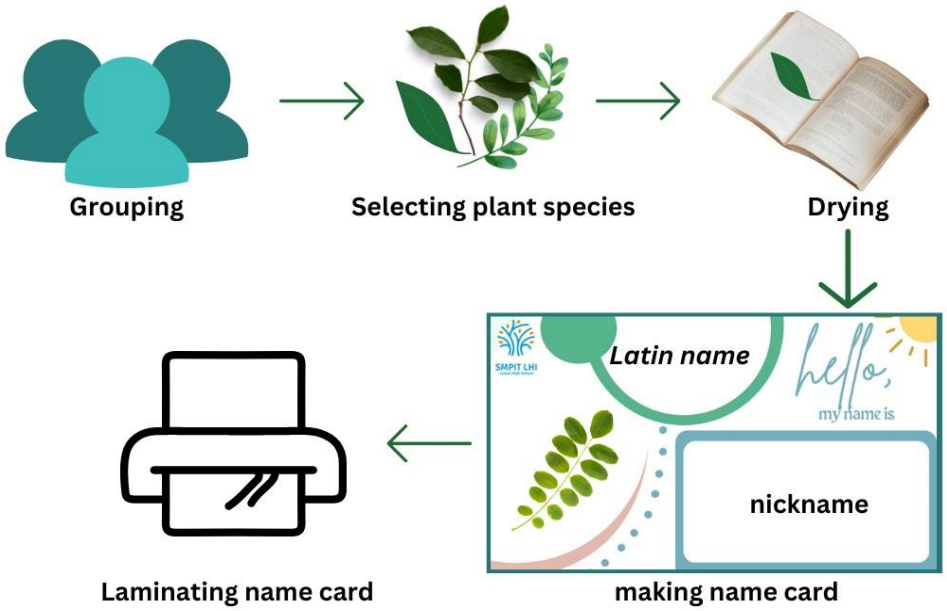

Figure 2. The process of making herbarium-based name cards

The herbarium name cards that were created were subsequently utilized in science learning activities. Students attached the name cards to their chests using safety pins. It was mandatory for students to wear the name cards during every science lesson. The science learning process was designed to incorporate a range of independent and group activities, enabling students to become accustomed to using their name cards in every lesson. This facilitated the teachers in identifying students by directly reading their name cards. Figure 3 showcases pictures documenting the card-making process by the students, as well as the resulting name cards.

Figure 3. Documentation of the process and results

While making herbarium-based name cards, it was observed that students were actively and skillfully engaged in tasks such as drying herbarium leaves,

writing the Latin names of plants, and completing the cards. PjBL could effectively activate students' learning (Dharmayani, 2021); (Ramadianti, 2021). Students also experienced a sense of challenge while creating name cards, as it necessitated independence and accuracy in tasks such as writing, cutting, and laminating. This observation aligns with the argument that PjBL fosters students' development of independence in learning (Martiani, 2021); (Devi et al., 2019). Group projects not only enhance SLI, but they also foster the development of valuable collaboration skills among students (Pebrianti et al., 2021); (Pratiwi et al., 2018). This is attributed to the implementation of project-based learning in groups, which facilitates meaningful student interaction during project completion.

Table 3. SLI scores

Score	Pretetest	Posttest Meeting-				
		1	2	3	4	Average
Lowest Score	60	85	83	83	83	83.5
Highest Score	90	95	95	95	91	94
Average	75	89	88	89	89	88.75
Standard Deviation	5.11	4.22	3.39	3.97	2.78	3.59

During the implementation of the herbarium card project, the teacher closely monitored SLI. The learning process, using the PjBL model, spanned four sessions. Data pertaining to students' independent learning, observed throughout the learning process, is presented in Table 3. Based on these scores, the difference in students' learning independence scores between the pretest (before implementing the PjBL model) and posttest (after implementing the PjBL model) is graphically depicted in Figure 4.

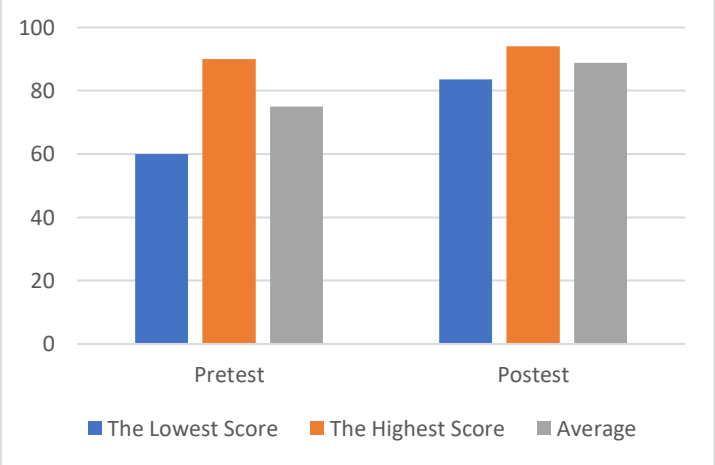

Figure 4. Scores of SLI in the pretest and posttest

In addition, a statistical analysis was conducted to determine whether there is a significant difference in SLI scores before and after implementing the project-based learning (PjBL) model. The T-Paired Test was utilized for this hypothesis test, preceded by a normality check as a prerequisite. The results of the normality check are presented in Table 4.

Table 4. Normality test

Hypothesis Prerequisites Test	Significance Value
Normality Test	0,053

The normality test conducted on the data related to student learning concentration, as shown in Table 4, yielded a significance value of 0.533 or sig.> 0.05. These results indicate that the data follows a normal distribution. As the data met the assumption of normality, the hypothesis could be tested accordingly. The results of the T-paired test for the hypothesis can also be found in Table 5.

Table 5. T-Paired test

Variable	Sig. (2-tailed)
SLI	0,001

The results presented in Table 5 indicate that the T-Paired Test yielded a significance value of 0.001, with a sig value (2-tailed) < 0.05. These findings reveal that the treatments resulted in significant differences in SLI between the pretest (before treatment) and the posttest (after treatment).

Table 6. Student responses to the media and learning implemented

No.	Statements	Answers	
		Yes	No
1	Herbarium-based business card creation helps to recognize examples of Latin names.	26	7
2	Making herbarium-based name cards used as group members' names helps students remember their identity and group members.	26	7
3	Making herbarium-based business cards trains independence.	29	4
4	Making herbarium-based name cards increases the spirit of sharing between group members.	23	10
5	Making herbarium-based business cards strengthens concern among group members.	21	12
6	Making herbarium-based business cards makes the relationship between members of the group closer.	19	14
7	Making herbarium-based business cards strengthens collaboration among group members.	15	17

In order to further strengthen the research findings, the researchers administered questionnaires to the students. These questionnaires aimed to assess the students' reflections on their independent learning experiences. The results of the questionnaire data are presented in Table 6.

From the data, it is evident that 79% of students felt that the creation of herbarium-based name cards helped them recognize the authentic Latin names of plants, making it easier for them to remember the plants' identities and their group members. In terms of independence, 88% of students stated that the process of making herbarium-based name cards fostered their independence. Students reported engaging in activities such as selecting plant leaves, drying them, affixing Latin names, and laminating them independently. They also mentioned that during the weeks-long learning process, they were required to keep their name cards private.

Furthermore, although statements 4-7 highlighted the value of collaboration, the data did not reveal any percentage higher than 80%. This suggests the need for further evaluation and the consideration of additional activities within this learning model to maximize both SLI and collaboration simultaneously.

The overall experimental results indicate a significant increase in SLI through the implementation of the PjBL model. The findings demonstrate that the treatment using the PjBL model positively influences and enhances SLI among students (Kopzhassarova et al., 2016); (Aliftika et al., 2021); (Nahdliyati et al., 2016). PjBL empowers students to independently innovate and complete their projects (Martiani, 2021). Implementing this approach has the potential to enhance SLI, fostering a greater sense of autonomy and self-directed learning.

Conclusion

In conclusion, the findings of this study demonstrate that the project of making herbarium cards in science learning effectively promotes students' independence. The analysis results, using the T-Paired Test, revealed significant differences in student learning independence (SLI) between the pretest and posttest phases. The obtained significance value of 0.001, with a sig value (2-tailed) < 0.05, confirms this significant difference in SLI. Moving forward, it is recommended that future research explores the integration of additional activities within the project-based learning (PjBL) model to enhance teamwork and collaboration among students while maintaining their independence in project completion.

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ANXIETY EFFECT ON STUDENTS AND PERFORMANCE IN BIOLOGY: A CASE STUDY AMONG SECONDARY SCHOOLS IN SOKOTO CITY, NIGERIA

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Abstract
The Sokoto state needs biology-based students for the making of many useful professionals that works in a diverse array of human lives. However, there is a report showing poor performance in the subject. Anxiety is an issue that may affect education; thus, this work aimed to assess the issue of anxiety among students of biology in secondary school, the related causes, and control. The study design applied was a survey (questionnaire) among 400 students in Sokoto and the data was managed using descriptive statistics. Sources revealed include: How often do you hear from your family while on campus had the greatest percentage with 40.0%, then by Lack taking in a well-balanced diet with 30.0 %, How often have you been following your time table had 20.0%, followed by Distractions or disturbances from a roommate on campus (7.5%), and the least was How often have you been angered because of things that were beyond your control on campus with 2.5%. The effects of anxiety on academics include: Anxiety distracting from the lesson (40.0%), and reduces morale in academics (30.0%). Anxiety prevents students from finishing their assignments (20.0%), and elicits absenteeism (10.0%). Anxiety management includes: Major ploy is enough time and participating in extracurricular activities. Guidance and counselling/discussions with friends are helpful. Thus, academic anxiety can be tamed for better learning. Education on anxiety, enough rest, staying focused, and exercise are needed to enhance students' academic performance.

Keywords: academic performance, anxiety, biology, science, teaching

Introduction
Education relays as a bedrock needed for national change and development, and it is good for the growth of any country in the world. It serves as a link to development as it prepares youth, adults, children, women, and men for growth and development for the sustenance of communities and individuals. education help in the growth of a person or people politically, socially, technically, and scientifically (Adan & Orodha, 2015; Chukwuma et al., 2014; Young et al., 2017). Therefore, in

Nigeria like in any other place, there are various systems and places of education that a person must pass before being educated for the needs of the individual and the larger society. Secondary education is a principal component of education in Nigeria that relays to primary and advanced education as enshrined in the famous National Policy of Education (NPE) aimed at providing education for all (Adan & Orodha, 2015; Chukwuma et al., 2014; Garba, 2012). Secondary education shall provide prepare an individual for later education and also has to make children that can think for development, and respect all. Skills supposed to be provided to the students, for example, agricultural, industrial, commercial, and economic foundations are taught to secondary school students to model them for advancement (Adan & Orodha, 2015; Chukwuma et al., 2014;). In turn, manpower for making useful members of society that specialize in areas such as technology, sciences, commerce, and other professionals are groomed at the secondary education level (Chukwuma et al., 2014; Garba, 2012; Umar et al., 2017; Umar et al., 2018).

Nevertheless, science has continued to be a critical parcel of secondary education that proffer students with experience and understanding of recent and future challenges. It is a study of very significance that allow students to inquire, and explore, science-based and related fields (Miya et al., 2023; Young et al., 2017). In this current world that is bedevilled with challenges and problems, science learning transmits knowledge and gives skills that reach all citizens for individual development and social change. Science calls for students that guarantee the participation of citizens in sciences and technologies, and seek social justice to interact with the environment and people (Mensah et al., 2017; Hiliya et al., 2022; Reis, 2021). A major science subject is biology. Biology nowadays has become a way of study, and an impact of living. The subject helps to inform the students about the scientific overview of the world to be competent citizens of the world. Without biology, people could not be able to live a healthy life in a well-preserved environment. Biology helps students in many ways like the followings: mastery of the nature of living organisms such as plants and animals, provision of environmental education, to give an overview of the material nature, etc (Hiliya et al., 2022; Mardonov, 2019; Mushtaq & Khan, 2012).

However, many important factors are currently militating the teaching and learning of science subjects in secondary school settings (Mahajan, 2015). A major problem affecting the learning and teaching of biology, a principal science subject is the issue of anxiety. Anxiety is a mixture of psychological states that militates cognitive, behavioural, and psychological status. It is a state of distress due to a certain condition and is universal even in many circumstances of education. Academic anxiety happens due to an issue of learning or education-related condition (Ang et al., 2006; Cimen & Yilmaz, 2015). Anxiety in academia is a good thing when it stimulates students to achieve greatness, and sometimes high level of anxiety is a great militating factor in education. When anxiety grows it becomes excessive and makes students no longer productive (Mahajan, 2015). A study in Pakistan by Ali and Mohsin, (2013) revealed that anxiety due to test significantly affects the achievement of students in sciences including biology learners. A specific study of science mathematics subject anxiety in India has revealed that mathematics anxiety significantly affects mathematics creativity in the affected study subjects (Sharma, 2014). In a Nigerian study, it was revealed that cognitive test anxiety in biology is a factor that determines achievement in the subject

(Orakwue & Okigbo, 2023). From this, the scarce data regarding biology anxiety needs to be expanded to contribute to the improvement in biology teaching and learning. Thus, this work was designed to examine the problem of academic anxiety among students of Biology in secondary school, its causes, and ways of controlling it to enhance the student's performance.

Method

Research design

Research design tends to be the methodology that a researcher utilizes to obtain the required information. Descriptive study design dealt with the gathering of data to describe, and interpret, existing situations or circumstances or beliefs, or relations. It is the discovery of meanings and concepts and it is applied in many qualitative studies, especially in education and social sciences. It uses the approach of the survey in the data collection procedure to guarantee coverage of the research area through representation. The study design utilized for the sake of this work was the descriptive survey design method to study anxiety among biology students in the study area (Creswell, 2014; Malik & Balda, 2006; Jha et al., 2022; Mardonov, 2019; Saunders et al. 2016; Young et al., 2017).

The population of the study

According to Dikko et al., (2022), the population of any study is referring to all the entire members or elements in the group that the result of the study could be generalized upon. It can all variables the problem is addressing such as cars, human beings, houses, animals, etc. They are the variables that are affected by the study. A population deals with the whole universe or all the members of a group that are being studied and sometimes the population could be large or small as the case may be. Pertaining to this work, the study population includes the entire secondary school students offering biology in Sokoto, Nigeria.

Moreover, as aforementioned, this research will focus on all the secondary school students in Sokoto Metropolis that are taking biology as a subject of study. Secondary school biology is taught in most of the secondary schools in Sokoto (at senior secondary school levels) to confer the ability to appreciate life science and to be able to study science-based courses at higher institutions of learning after leaving secondary school education. Accordingly, there are sixty-three senior secondary schools in Sokoto state, Nigeria.

Table 1. The population of students enrolled at Senior secondary schools in Sokoto Nigeria

S/N	Local government in Sokoto metropolis	Number of students
1	Sokoto South	8186
2	Sokoto North	24146
3	Wamakko	4059
Total	36391	

Source: Ministry of Education Sokoto, 2010

Sample and sampling techniques

Certainly, in most cases, the population of the study is too large to be taken in a study. Therefore, a trick to reduce the population to be observed has to be

utilized. A few members that are sufficient representatives of the entire population have to be selected using appropriate sampling methods. Malik & Balda, (2006) stated that the sampling is a ploy to seek some respondents to represent the entire population appropriately.

Albeit, there exist many sampling methods, for this work the best sampling strategy was employed and respondents were selected. The best sampling ploy used in this study was upon this work was the random sampling technique. In this sampling, this work used 400 self-administered questionnaires (after retrieval). The sample size utilized was obtained through a Raosoft calculator as indicated in Table 2.

Table 2. Sample size in the study

Parameter	**Value**
Margin of error	5%
Confidence limit	95%
Assumed population size of the study	36, 391
Response distribution	50%
Recommended sample size	381
Compensated sample size	400

Source: wwww.raosoft.com

Instrumentation

The instrumentation in a study is the process followed in selecting, adopting, and utilizing the right tool to collect data for the sake of the study. One of the major instrumentations for research studies is the questionnaire. Thus, for this work, a questionnaire was the instrument utilized for data collection from the respondents. Questionnaires elicit feelings, ideas, and relations from the respondents, especially in large and heterogeneous populations and it is best in this work because the subjects of the study are literate (can read and write appropriately) according to the biddings of the questionnaire objectives. The questionnaire made for this study strived and filled the aim of the study objective and research question as well Malik and Balda (2006), Renk and Smith (2007).

Validity of instrument

The validity of an instrument means the document can measure exactly what was intended (Sarkingobir & Sarkingobir, 2017). The questionnaire has subsections as follows: Section A measures the demographic information from the respondents. Section B looks for the information and asked questions on the anxiety source, section C sought the academic performance. And section D was asked about students' feel due to anxiety. The questionnaire was made with multiple choice questions for the respondents to tick. Validity to collect proper data was measured through validation by experts so that the instrument measures its intended questions.

Reliability of the instrument

Reliability is the quality of the questionnaire to measure what it was designed for. A pilot study and test-re-test methods were applied to ensure the validity of the instruments. Reliability of the instrument is when the instrument can measure what it is supposed to measure. It also shows that the instrument is reliable at different

points in time. Methods of reliability involve the test-re-test method, split-half method, and pilot study. Test-re-test method- the instrument was administered at different times to the subjects, when the results are similar, then it is reliable. Split-half method- divides the subjects and administers the instrument, if the results are similar, it is reliable. A pilot study refers to carrying out a mini-study to assess the workability of the instrument (Abdullahi et al., 2023; Dikko et al., 2022).

Method of data collection

Ethical issues had to be maintained in the collection of the data for this work. Ethics including consent, and confidentiality, were maintained (Sarkingobir et al., 2023). Respondents had to be briefed on the purpose of the work and possible benefits. The participants were then allowed to fill out the questionnaire for the study.

Data analysis

The students were allowed to fill out their questionnaires. The filled (answered) questionnaires were collected from the participants and analyzed according to research questions/objectives. Descriptive statistics tools like frequency and percentages were used. Also, advanced statistical analysis software packages such as Microsoft Excel and SPSS were employed and measured the X^2 test.

Findings and Discussion

This section addressed the information gathered to assess the impact of anxiety on the academic performance of Biology students in Secondary schools. Primary data was obtained according to information collected from students from secondary schools offering biology subjects in their curriculum. About four hundred questionnaires were distributed, and 400 respondents had been recovered. The analysis is done based on the information received from the students and interpreted to know the impact of anxiety on the academic performance of Biology secondary school students.

"The main objective of this study is to examine the effect of anxiety on the academic performance of Biology students in Secondary school"

Gender

Table 3 shows the gender and age of students in this work. Among the 400 respondents, the majority are males (64%) and the minority are females (36%).

Table 3. Showing gender and age of the respondents

Serial number	Frequency	Percentage
Males	64	64
Females	36	36
Age		
Less than 20	16	4
21-25 years old	344	86
26-30 years old	40	10

Table 3 shows the percentage of students based on their different ages. The ages that range 21-25 years are the most prevalent (86%), then the ages of 26-30 years (10%), and the least 4% are below 20 years old.

Sources of anxiety

In Table 4 sources of anxiety were depicted among the 400 respondents recruited in the study. The most prevalent was "How often do you hear from your family while on campus" the 40.0%, then "Lack taking in a well-balanced diet" had 30.0 %. They are followed by "How often have you been following your timetable" with a score of 20.0%, and then followed by "Distractions or disturbances from a roommate on campus" with a 7.5%. While the least score was (2.5%) "How often have you been angered because of things that were beyond your control on campus".

Table 4. Showing sources of anxiety in the student

Parameter	Frequency	Percentage
How often do you hear from your family while on campus	160	40
Lack of taking in a well-balanced diet	120	30
How often have you been following your time table	80	20
Distractions or disturbances from roommate on campus	30	7.5
How often have you been angered because of things that were beyond your control on campus	10	2.5
Total	400	100
X^2/ remarks	192.500	Significant

In this regard (Table 4), "How often do you hear from your family whiles on campus" is a great or major source of anxiety for students of Biology Secondary school.

Academic performance

In Table 5, the impacts of anxiety on the academic performance of students were shown. Out of the entire 400 students in the study, the most mentioned was "Anxiety distracts students' attention during lectures" at 40.0%, then followed by "Anxiety reduces students' academic morale" at 30.0%. The third most said (20.0%) was the "Anxiety does lead to failure in completing an assignment on time", and then followed the "Anxiety causes absenteeism in class" with a percentage score of 10.0%. While the last impact was "And lastly Anxiety does not help the students to get good grades in all courses". Certainly, it can be stated that (in Table 5) anxiety can militate the academic performance of students in Biology Secondary school.

Table 5. Effects of anxiety on the academic of students

Parameters	Frequency	Percentage
Anxiety distract students' attention during lectures	160	40
Anxiety reduces students' academic morale	120	30
Anxiety does lead to failure in completing an assignment	80	20
Anxiety causes absenteeism in class	40	10
Total	400	100
X^2/ remark	80.000	Significant

Anxiety in students' academic life

Out of the 4oo respondents, the opinions were displayed in Figure 1 showing that anxiety affects the academic life of students in biology in secondary schools in Sokoto, Nigeria. From Figure 1, the first bar showing "strongly agree", depicts that, anxiety certainly influences students' academic life with the peakiest score of 55%.

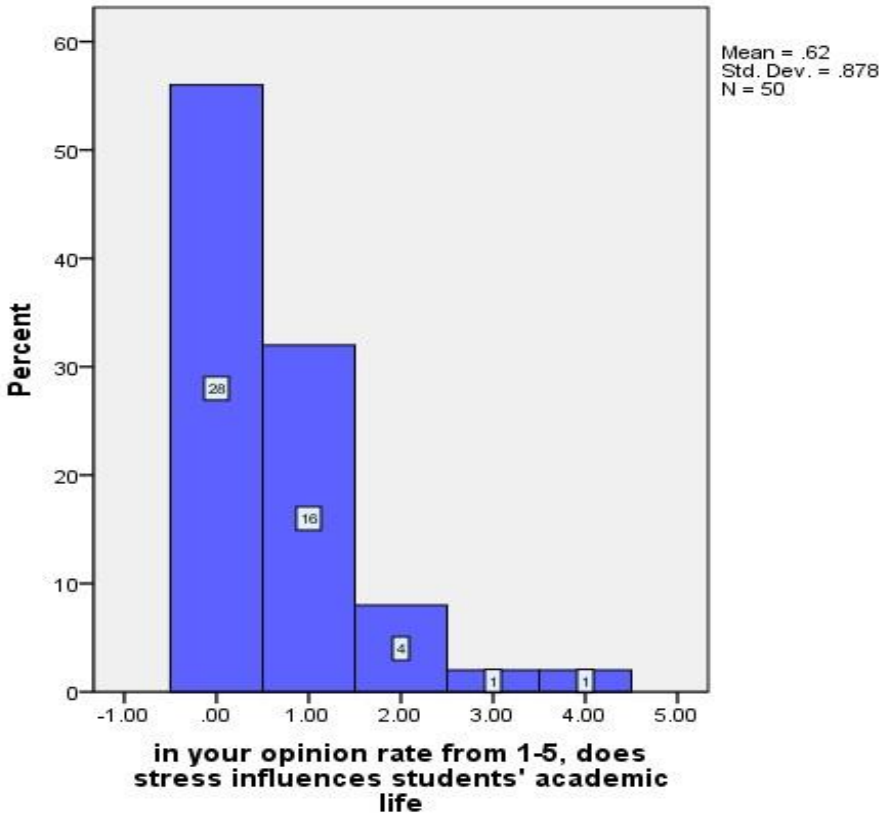

Figure 1. Anxiety as it affects students' academic life (N=400)

Anxiety awareness

Figure 2 shows the opinions of respondents on the need to teach anxiety education at schools. Out of the 400 participants, the majority (70.0%) submitted that (as depicted by the first bar, which represents "strongly agree"), it is imperative to teach shows anxiety awareness at schools.

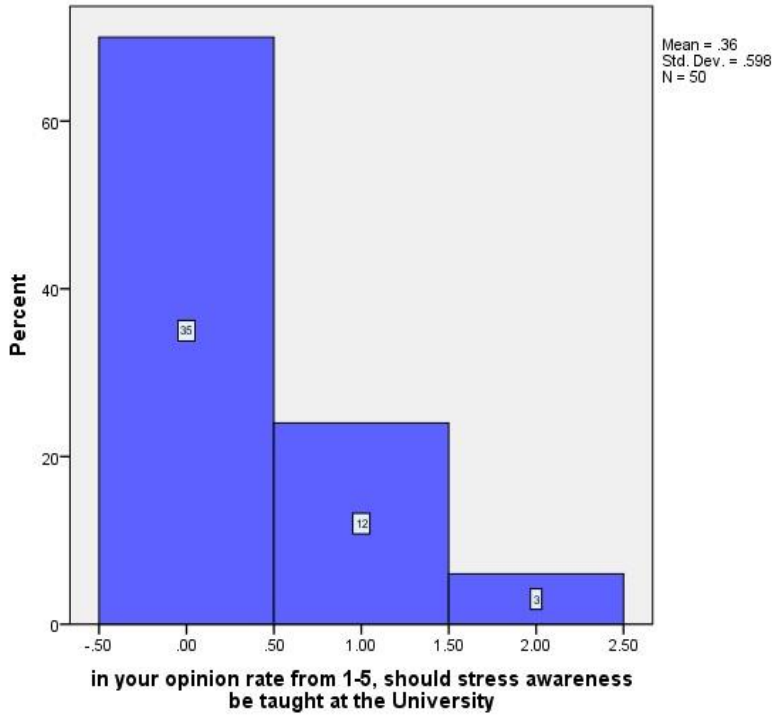

Figure 2. Should anxiety awareness be taught at the School (N=400)

Management of anxiety

In your own view, how can anxiety be managed?

Table 6. Showing responses on how to manage anxiety

Parameter	Frequency	Percentage
How do you manage anxiety?		
Meditation	100	25.0
Relaxation, and resting	60	15.0
Calming down	55	13.8
Engaging in hobbies/ physical exercise	40	10.0
Guidance and counseling	60	15.0
Study-life balance	50	12.5
Others	10	2.5
Peer engagement	25	6.3
Total	400	100
X^2/ remark	101.000	Significant

In Table 6, how to manage anxiety was stated. While most of the participants believed giving enough time, the use of extracurricular activities (such as sports, and other hobbies) is vital in receiving anxiety at schools. Likewise, craving guidance and counselling/discussing with friends are significant.

How do you feel when you are anxious?

Out of the 400 participants, the majority (67.0%) decried that, occasionally do not feel well. Others (20.0%) decried lack of sleep at night. An average portion of them (10.0%) decried, feeling tired during the day, and the last portion (3.0%)

decried of other things (3.0%). It is right to say, the majority of participants do not feel well due to anxiety.

Summarily, the purpose of this study was to assess the impact of anxiety on the academic performance of Biology students in Secondary school. The work unveiled that, the participants had felt one form of anxiety or another. Thus, the issue of anxiety is a common theme in schools and has to be controlled for the success of secondary school students, because it militates students' academic performance. The study further found that students not hearing from their families while on campus was the major source of academic anxiety even though there were other sources such as how often they had enough money on them and enough sleep.

More so, this study examined the relationship between academic anxiety and academic performance. It found that the overwhelming majority of the students affirmed that academic anxiety affected their academic performance. Finally, the findings concluded that the majority of the respondents argue that having enough time and getting engaged in extracurricular activities like sports and other entertaining hobbies play a significant role in helping to deal with anxiety. Also seeking guidance and counselling or discussing with friends helps a lot.

Biology is a popular science subject that is paramount in secondary schools in the country as a tool for advanced studies in Nigeria. Biology is a natural science that aimed to examine life, living organisms, and related ideas therewith. It helps students and scholars to appreciate the living world and has to be dealt with for the progress of various advanced fields such as medicine, agriculture, biotechnology, and other health/medical fields. Therefore, the subject is important in various fields and to several students in Sokoto, and Nigeria as well. However, for the students in this subject, there are still outcomes that are not favourable in terms of learning and examination results about biology (Orakwue & Okigbo, 2023). Thus, researchers had been on the strive to enumerate and discover factors that affect biology education. It is bound to seek factors that affect the academics of students. Anxiety is a feeling of uneasiness regarding biology and there is a quest to check for its effect and associated factors in biology education. The sources or elicitors of anxiety found in this study are determined as (shown in Table 4): How often do you hear from your family while on campus had the greatest percentage with 40.0%, followed by Lack taking in a well-balanced diet with 30.0 %, How often have you been following your time table had 20.0%, followed by Distractions or disturbances from a roommate on campus (7.5%), and the least was How often have you been angered because of things that were beyond your control on campus with 2.5%. Similarly, as shown in Table 3, the issues that are bound with academics were affected by anxiety as submitted by the participants in this study. The effects of anxiety are as follows: Anxiety distracts students' attention during lectures, Anxiety reduces students' academic morale, Anxiety does lead to failure in completing an assignment, and Anxiety causes absenteeism in class. This was in tandem with what was found by another study on the effect of anxiety on another important and perceived science course (mathematics) (Salahot, 2022). In another study, a significant effect of anxiety on the academic performance of students was related to university students of Allama Iqbal University Pakistan (Ajmal & Ahmad, 2019).

Additionally, as was depicted in Figures 1 and 2, anxiety affects academic life and participants submitted that anxiety should be taught at school as that would invariably help in making students effective in dealing with anxiety at school or

even after school. In this vein, Ajmal and Ahmad (2019) reiterated that anxiety can reduce the performances of students irrespective of the field they are learning. Teaching students about anxiety or any other health event will invariably help the students to be more knowledgeable and take appropriate measures when confronted with an issue (Dikko et al., 2022; Miya et al., 2023ab). In another study, Cimen and Yilmaz (2015) reported in their study that, high school students when taught about anxiety and self-efficacy at school help them prominently. Thus, it is important to teach students about anxiety and self-efficacy at schools.

However, on how to manage anxiety at schools, the findings made submissions accordingly. The submissions given by the participants relate to ways to manage anxiety at schools in Sokoto, Nigeria. Most of the participants echoed that, ample/ sufficient time and involvement in extracurricular activities (such as sports and hobbies) are vast in dealing with anxiety at school. Similarly, the sought of guidance and counselling; and discussion with peers is important in helping to curb anxiety at school. The use of counsellors in anxiety management, teaching coping skills, and communication with families of students were corroborated by Akinsola and Nwajei, (2013). Training teachers on anxiety management is another way to deal with anxiety at schools as related by Jha et al., (2022). Thus, anxiety can be dealt with using a composite of strategies.

Conclusion

This study was done to assess the anxiety in biology students in Secondary schools in Sokoto state, Nigeria, and discovered that there exists anxiety experienced by the students. Sources of anxiety among biology students in secondary schools in Sokoto were discovered, as ways to manage the issue. In the same vein, their issue can affect the academic anxiety on the performance of students as well. Some of the discovered effects include class absenteeism, reduction in academic morale among students, and failure to do assignments on time. Thus, academic anxiety has negative effects on students' performance. The more the anxiety, the less the student will perform at school. From the side of students, it is good to say, to address the issue, students need to be focused, rest enough, exercise to prevent anxiety, and proper time management is good, to boost the academic performance of students.

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TEACHING STRUCTURE-BASED DRILLS AND COMMUNICATIVE DRILLS AT THE PRIMARY EDUCATION IN THE EFL SETTINGS

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Abstract
This paper investigated the differences between two teaching techniques: structure-based and communicative drills in students' speaking achievement and the improvement of speaking aspects after implementing those two techniques. The researcher employed the experimental design in this present study. A purposive sampling was used to choose the samples of one primary education in East Lampung, Indonesia. To gather the data, the researcher used the instrument of the test. The data were analyzed by using the *Indpendent-Samples T Test* and *Paired-Samples T-Test.* The results of the study showed that there was any statistically significant difference in students' speaking achievement between the experimental class and the control class (.004<.05) and those two different techniques had improved some aspects of speaking skills in terms of grammar, vocabulary, comprehension, pronunciation and tasks.

Keywords: communicative drills, EFL settings, primary education, structure-based drills

Introduction
Speaking is considered the ability to maintain communication via verbal language. It is hard to resist the importance of being able to speak English fluently since the new millennium has turned English into the most prominent foreign language learned by EFL learners including in Indonesia. Consequently, many EFL learners are being aware of the necessity to learn English by practicing language to promote their communicative competence since they were at the primary education level. It seems that early education is pivotal to have a strong preparation for entering great opportunities both in secondary studies and wider opportunities in the future (Choi & Lee, 2008; Garton, Copland, & Burns, 2011; Saville-Troike, 2012).

However, establishing English in the curricular requirement of primary schools does not always guarantee that the student's achievement and capability of speaking will be satisfactory in the future. Most of the students, both in the secondary and higher education level, face many difficulties to speak English even though they have already learned English since they were in primary school.

Some main factors may influence the incapability of students to speak English, especially for the students at the primary education level in Lampung, such as inappropriate curriculum, unqualified teachers, students' low motivation in learning English, and lack of learning resources: textbooks and learning media (Sutarsyah, 2017).

To cope with the problems mentioned above, English teachers are suggested to creatively plan the appropriate and effective teaching methodology by the means of developing or modifying some teaching techniques. The term teaching technique refers to any of a wide variety of exercises, activities, or tasks used in the language classroom for achieving the lesson objectives (Brown, 2001). The way how the researcher might develop a drill based on CLT principles is because the case in which the goal of teaching based on the curriculum is mostly lying on how to use language as a communication device both in local and global interaction. Some previous teaching drills no longer fit the goal of being able to speak English naturally and fluently. Thus, in this present study, the researcher is concerned to research implementing and comparing two teaching techniques namely structure-based drills and communicative drills.

Numerous studies have been conducted to investigate the use of drills in the EFL context. Riswanto and Haryanto (2012) conducted one of some studies concerning the use of communicative drills for Senior High School students. The results revealed that students' pronunciation achievement was significantly improved by using communicative drills. Instead of explaining the proper vocabulary used in drills and at what level of their improvement comes to promote their competence, the researcher only described the improvement of the pre-test and post-test scores in three cycles. On the other hand, Khodamoradi and Khaki (2012) had been also researched the effect of mechanical drills and meaningful drills on the grammar acquisition of foreign language learners. The result showed that the meaningful drill was over than the mechanical drill to acquire grammar since the meaningful drill leads them to have a higher cognitive process and better acquisition in internalizing the form. To cope with the meaningful drill for better acquisition, the students are required to focus both on form and forms.

However, both mechanical drill and meaningful drill may have their contribution to work respectively in promoting linguistic competence and communicative competence. Thus, an empirical study is still needed to investigate the development of drill sequences to promote students' linguistic competence and communicative competence. To support the investigation, the most recent study has already been conducted by Scheffler (2016) in implementing bilingual pattern practice. The researcher provided the activities of semi-communicative drills among Polish adult learners at an English course. The bilingual pattern refers to the drill that comes in two main categories: meaningful and communicative. The bilingual practice was implemented by a set of drill patterns in Polish and English. The result showed that bilingual pattern practice may result in the acquisition of their linguistic competence before they cope with English to communicate.

However, the previous research only tackles the use of drills for secondary or adult-level students. Besides, the implementation of drills in the previous research is mainly focusing on the grammar form, not communicative purposes. Thus, this current study is conducted to investigate the effectiveness of drills for

students at another level, especially for the primary education level, to treat language as a means of communication.

Teaching speaking to young learners

Teaching speaking to young learners is verily different from teaching adults or teenagers in certain ways. The sense of teaching itself is not only about answering the question of what the students are truly needed to learn but also the way how they will engage themselves in learning. Therefore, Brown (2001) suggested 7 principles for creating an effective environment for teaching speaking to young learners:

1. The teacher is suggested to develop some techniques that cover the needs of young learners in learning to speak. The techniques used by the teacher must be oriented to the nature of the interaction in which carrying the meaning of the message is pivotal to developing the speaking competencies of young learners, especially their fluency. It is in line with the notion claimed by Cameron (2001) that stating young learners as slower learners than older learners in the light of learning grammar or forms that focus on accuracy.
2. The teacher is suggested to use the techniques that will trigger the students learning motivation. Motivation emerges when the students are eager to speak. The teacher may use some topics that will invite the students' interest and their willingness in learning (Ur, 1991).
3. The teacher is suggested to create meaningful learning. Meaningful learning is characterized by providing authentic materials in teaching speaking. Authentic materials refer to teaching resources (e.g.: texts, photographs, video selections) that are not prepared for instructional purposes but mainly to involve the students in using English for a variety of communicative purposes (Richards, 2001). Therefore, the teacher who teaches speaking through authentic materials must be able to engage the students with their real-life issues outside the classroom.
4. The teacher is suggested to give some appropriate feedback and correction for the students' errors in their speaking performance. Corrective feedback can be an alternative to avoiding the errors to be fossilized. It is believed that corrective feedback can be very beneficial to promote students' grammatical and oral competence since it may provide the students with the input and acquisition process for the language being learned (Broughton et. al., 1980; Lyster & Ranta, 1997; Celce-Murcia, 2001).
5. The teacher is suggested to provide activities in which the students are encouraged to listen and speak. Some activities that may include developing aural-oral skills are: singing, memorizing, and reciting (Gauntlett & Hornby, 2005).
6. The teacher is suggested to initiate oral communication for the students to practice. Initiation is identified as the stage to get the students involved, engaged, and ready to communicate (Harmer, 2007; Dayag et al., 2008). The teacher may ask a question or action as the stimulus to initiate student interaction in the classroom.

7. The teacher is suggested to consider some strategies in teaching speaking. Some strategies can be implemented in teaching speaking, such as: doing a role-play, implementing a creative task, and drilling (Anjaniputra, 2013).

Teaching skills: The psychomotor domain of learning objectives

There are three domains of learning namely: cognitive domain (knowledge), psychomotor domain (skills), and affective domain (attitude). The three domains of learning were first introduced by Benjamin Bloom and other researchers in the term "Taxonomy of Learning Domains" in 1956 (Bloom, et al., 1956). Those three domains were very beneficial to be included in the process of learning.

However, in the matter of how to formulate the learning objectives in teaching speaking to young learners of this present study, the researcher adopted the theory of The Psychomotor Domain of Learning Objectives proposed by Dave (1975). Based on Dave's taxonomy, the objectives of learning must represent the degree of competencies in performing skills. Thus, there are five levels of skill in this taxonomy:

1. Imitation
   This level requires the students to observe and repeat after the teacher. The students only need to imitate what the teacher says or what the teacher does. Thus, the teacher may use some operational verbs in designing the learning objectives, such as: copy, follow, mimic, repeat, replicate, reproduce, and trace.
2. Manipulation
   At this level, the students are required to perform a certain behavior by memorizing the pattern or following the teacher's instructions. This level makes the students act on their own without imitating the teacher first. The students are only guided by the teacher via instruction to perform a skill. Thus, the teacher may use some operational verbs in designing the learning objectives, such as act, build, execute, and perform.
3. Precision
   This level requires the students to perform a skill or task without assistance from the teacher. The students need to work and rework their production by refining them to be more exact, accurate, and proper. Thus, the teacher may use some operational verbs in designing the learning objectives, such as: calibrate, demonstrate, and master.
4. Articulation
   This level requires the students to coordinate a series of actions in harmony. They need to combine, sequence, and perform the series of skills consistently. Thus, the teacher may use some operational verbs in designing the learning objectives, such as: adapt, construct, combine, customize, modify, and formulate.
5. Naturalization
   This level requires the students to perform a skill without thinking much about it. The performance is automatic with ease. Thus, the teacher may use some operational verbs in designing the learning objectives, such as: create, design, and develop.

Drill sequences

At the very first stage of foreign language classroom practice, language drills are very promising to supply an activity in which the students can learn a language quickly and effectively. The drill is typically a technique that significantly can improve the effectiveness of learning by relating language patterns with real-life situations (Oller & Obrecht, 1968). To adhere to some procedures for conducting drills, the researcher provides a figure of drill sequences proposed by Paulston (1971), as follows:

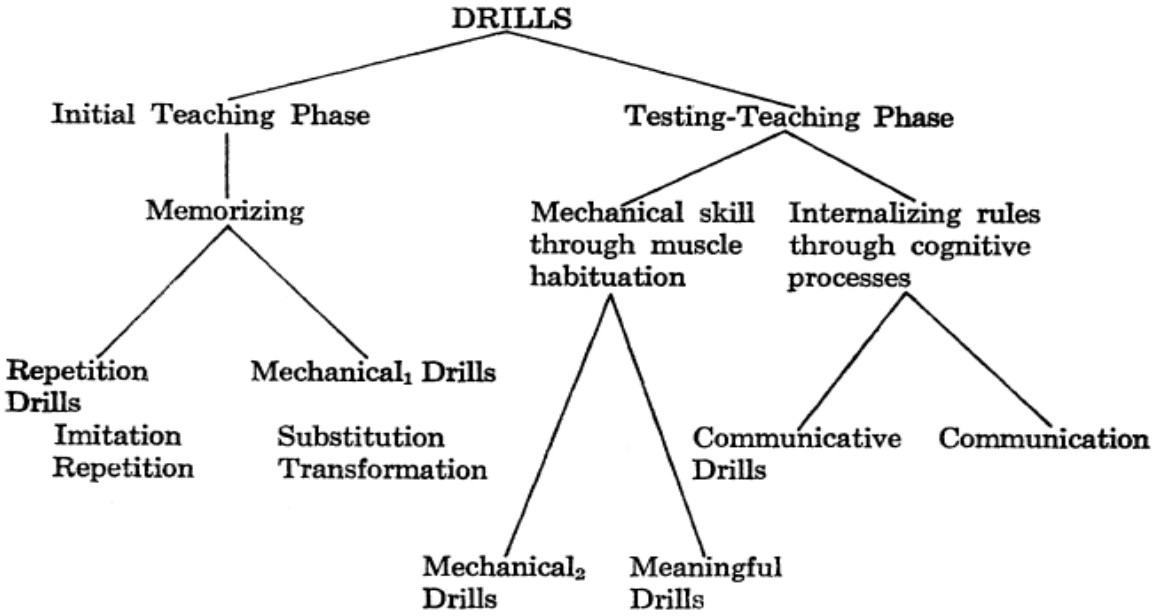

Figure 1. Drill sequence

According to Figure 1, some procedural descriptions of drills are available to be considered by two governed conceptual frameworks in grading and sequencing drills: teaching drills and testing drills. The former is related to some types of drills that will help the students memorize the pattern with zero possibility of making mistakes. Then, the latter is regarded as drills that will help the students reinforce the learning pattern optimally. Then, there are three classes of drills: mechanical, meaningful, and communicative. The term mechanical drills refer to drills in that the teacher is suggested to be highly responsible for complete control of the response given after the cues (Kameen, 1978). This implies that the students only need to respond correctly without understanding the meaning. The ability in memorizing certain patterns is the only requirement for being able to respond. This may constrain the students to express their ideas fluently.

At the stage of meaningful drills, the teacher is demanded to only have less control over students' responses. It is entirely different from mechanical drills. In meaningful drills, the teacher may supply the students with the necessary information for responding. This implies that the meaningful drills may have the check for feedback that shows the student's understanding of the language items being drilled. Whereas, communicative drills are mainly regarded as drills that require the students to communicate rather than to utter the speech patterns. The

experience of teaching communicative drills is encountered when the students can generate new utterances by internalizing the rules of grammar.

Structure-based drills vs. communicative drills

However, on this occasion, the researcher adopted the sequence of drills by two different assumptions: ALM and CLT. Those two different assumptions will lead the researcher to implement the different procedures of structure-based drills and communicative drills. In conclusion, here is the table of those two different drills in this present study:

Table 1. The difference between structure-based drills and communicative drills

No.	Aspect	Structure-Based Drills	Communicative Drills
1	Language Approach	Audio Lingual Method (ALM)	Communicative Language Teaching (CLT)
2	Scope	Focus on Forms (more focusing on accuracy)	Focus on Form (more focusing on fluency)
3	Purpose	To practice the target language through language patterns memorization and muscle habituation.	To practice the target language through the cognitive process of internalizing the language patterns.
4	Types	Substitution Drills Transformation Drills	Question-Answer Drills
5	Teacher's Correction	Correction is needed to avoid errors in students' speaking performance.	Correction is only needed when errors may hinder communication.

Method

The present study used an experimental design by employing two classes: experimental class and control class. The population of this present study was the students of one primary school in East Lampung, Indonesia. In further, the researcher employed purposive sampling by judging the most representative characters from the population (Ary, 2010). To collect the data, the researcher used the instrument of the test. The test used in this present study was an oral performance test.

To establish the content validity of the test, the researcher developed the test based on the English syllabus in the KTSP Curriculum and regarded the regulation of the targeted school by considering English as a local subject. Meanwhile, to measure the content validity of the test, the researcher invite the curriculum expert (at the targeted school) and the English teachers to have their judgments. The judgment was valid when it took a score of 66% agreed by the three judges. Then, in ensuring the construct validity of the test, the researcher adopted the theory of oral test scoring rubric proposed by Brown (2001) by the number of traits: grammar, vocabulary, comprehension, fluency, pronunciation, and task. Besides, the reliability of the test was further justified by using the role of the inter-rater.

In an attempt to answer the research questions, the researcher analyzed the data by running the *Independent-Samples T-Test*. The *Independent-Samples T-Test* was used to analyze the data of students' speaking achievement from the two

classes. On the other hand, the researcher employed the *Paired-Samples T-Test* to investigate the improvement of speaking skill aspects in both classes.

Findings and Discussion

The results and the discussion in this present study are presented clearly to answer all the research questions, as follows:

The differences in the students' speaking achievement

To attempt to answer the first research question of this present study, which is to investigate the statistically significant difference between the experimental class and control class in the students' speaking achievement, the researcher calculated the data by using the analysis of the *Independent-Samples T-test.* Here is the result of the *Independent-Samples T-test* analysis:

Table 2. The differences in the students' speaking achievement between the experimental class and the control class

	Class	N	Mean	Std. Deviation	Sig.
Speaking Achievement	Experimental	20	3.20	1.40	.004
	Control	20	1.90	1.25	

Note. $p < .05$

According to the data provided in Table 2, it can be seen that there was any difference in the mean score between the experimental class and the control class. The mean score of the experimental class was higher than the control class. The mean score of the experimental class was 3.20, while the control class was 1.90. The significance value of the difference was .004. It means that the value was lower than *p* (.004<.05). Thus, it can be concluded that there was any statistically significant difference between the experimental class and the control class in the students' speaking achievement.

In defining the statistical analysis of the significant differences between the students provided with structure-based drills and communicative drills in their speaking achievement, here the researcher provided some plausible explanations to support the data.

1. Problems.

After conducting the pre-test in both classes, the researcher found that most of the students still had unsatisfactory results in their speaking. Thus, the researcher had implemented two different drills namely structure-based drills and communicative drills for the students. The treatment was conducted in 3 weeks. In the beginning, the researcher found that most of the students still lack mastering some familiar vocabulary. Thus, in the first week of the treatment, the researcher asked the students to memorize some familiar vocabulary related to the topic.

The students were instructed to write down the vocabulary in their English notebooks. Besides having the vocabulary in their English notebook, the students were also invited by the researcher to practice speaking online (e.g.: WhatsApp Video Call). However, most of the students were unable to interact online since they were afraid of being ashamed in front of their friends. Thus, the researcher decided to invite the students by making them a small group (consisting of 2-4 students) by considering their friendship.

In light of doing the treatment in the experimental class, the researcher implemented communicative drills with much effort. An intensive speaking class was conducted since the students were not able to accomplish the tasks by themselves. Thus, along with the treatment, the researcher got the role of a facilitator to help the students accomplish the task. When the researcher conducted the online teaching-learning, most of the students were unable to do the task since they were being affected by the common rules of avoiding zero mistakes. Thus, to make the students feel comfortable to express their speech freely, the researcher convinced them that there was none of the critics would underestimate them. Instead, the researcher would correct them after they already practiced their speaking or whenever they needed a correction. As a result, in week 2-week 3, the students were more confident to practice their speaking with very little help from the researcher. Occasionally, the students also reported and consulted their work via WhatsApp Messaging. However, there were only a few students that still had a little anxiety and inhibition during the process of teaching-learning. Those students were not actively engaged in the learning process since they were much afraid of being laughed at or criticized by their friends.

In the counterparts of the experimental class, the researcher implemented structure-based drills in the control class. In week 1, the students were not able to perform well in their speaking. They were not able to memorize the sentence patterns in one meeting only. It was merely caused since the students had little practice in pronouncing some words. Thus, they were still being affected by pronouncing the words in their spelling (Indonesian language) rather than natives. For this reason, the over-repetition happened both inside and outside the online classroom. The researcher provided the students with the materials (online video) to help them memorize the patterns. As a result, in week 2, the students had better performance in their speaking. However, whenever the researcher instructed them to substitute or transform the sentence patterns, the students still had some difficulties with it. It was merely caused since the students had already contrasted the patterns of their language with the target language. Thus, the researcher sometimes explained briefly the grammatical rules for making an appropriate sentence in the target language. The corrections made by the researcher were done until the students had no mistakes in performing their speaking.

2. Learning activities.

In this present study, the researcher did different procedures in implementing the teaching techniques. In the procedures of conducting teaching through communicative drills, the researcher found that most of the students were very active to express their speaking. Whenever the researcher instructed them to speak, they were able to do the instruction very well. They asked the teacher for any corrections or suggestions whenever they found some difficulties in their practice. Besides practicing language by themselves, they also practiced speaking with their friends in a group. They could work collaboratively to accomplish the task. In addition, the students were very happy to use the technology (e.g.: smartphone) as their learning media. Thus, the availability of authentic materials (e.g.: videos on Youtube) and some communicative tasks was very beneficial to stimulate the students to enjoy the teaching-learning process. On the contrary, most of the students who were provided with structure-based drills only kept

remaining silent the whole time. They only did what the researcher asked them to do and they avoided asking a question whenever they did not comprehend the materials. They were passively involved in the learning process. Besides, they were only good at practicing speaking with their pairs than with others. Thus, they could not make a sustainable conversation at all.

3. Learning outcomes.

In the case of describing the learning outcomes, the researcher found that there were some slight differences in students' learning outcomes, as follows:

- The students who were provided with communicative drills were able to work collaboratively in a group rather than those in a structure-based drills class.
- The students who were provided with communicative drills were able to improve their grammar at a more advanced level. They were able to work and rework the sentence patterns by themselves with very little help from the teacher. Meanwhile, those who were provided with structure-based drills, the students had a better improvement in their pronunciation. They sounded like a native and they could avoid their mother tongue when they spoke.
- Both classes could comprehend the learning materials provided by the researcher. They were able to perform speaking at different levels of competence. However, employing the cognitive process in internalizing the sentence patterns could only be achieved when the students were treated through communicative drills.
- After conducting the teaching-learning through communicative drills and structure-based drills, the students were able to memorize some vocabulary items related to the topics. They were able to memorize the words and also know how to use the words appropriately regarding the context.

The improvement in speaking achievement

To answer the second research question in this present study, the researcher used the analysis of the *Paired-Samples T-Test* to analyze the data of students' scores in each speaking skill aspect. The table below was provided to show the result of running the *Paired-Samples T-Test* analysis.

Table 3. The improvement of each speaking skill aspect in both classes

Class	The aspect of Speaking Skill	Mean	Std. Deviation	Significance
Experimental	Grammar	-.500	.60	.002**
	Vocabulary	-1.05	.51	.00**
	Comprehension	-.700	.57	.00**
	Fluency	-.300	.86	.137
	Pronunciation	-.150	.67	.330
	Task	-.350	.48	.005**
Control	Grammar	-.050	.51	.666
	Vocabulary	-.750	.44	.00**
	Comprehension	-.350	.58	.015**
	Fluency	-.050	.82	.789
	Pronunciation	-.350	.48	.005**
	Task	-.250	.55	.056

Note. $p < .05$

According to the result presented in Table 3, it can be seen that there were six aspects of speaking skills being tested on the students both in the experimental class and the control class. In the experimental class, there were four aspects of speaking skills that had statistically significant improvement, they were: grammar, vocabulary, comprehension, and task. The improvement of those four aspects was statistically significant since the significance value shows lower than .05.

According to the statistical analysis, both classes had statistically significant improvement in some speaking skill aspects. For the students provided with communicative drills, there were some aspects of speaking skills that had statistically significant improvement: grammar, vocabulary, comprehension, and task. Meanwhile, for those provided with structure-based drills, there were only three aspects of speaking skill that had statistically significant improvement namely vocabulary, comprehension, and pronunciation.

1. Grammar.

Both classes had been exposed to grammar since they were in the first year of studying at the primary school. Most of the students were able to produce some simple expressions, e.g.: greetings, expressing an apology, asking for conditions, self-introduction, and leave-taking. However, since English was only practiced inside the classroom during the English lesson period, the students did not get used to being fluent speakers in their daily life communication.

For those provided with communicative drills, in the first week, most of the students were not able to produce a new utterance in a grammatically correct sentence. They produced the utterances by having any missing words in their sentences. Thus, the researcher provided them with input as the corrections for their errors. The researcher motivated the students to practice the sentence patterns until they got used to producing the grammatically correct sentence. By asking the students to repeat the sentence patterns many times, the students were able to comprehend the patterns. However, the main point of this case was merely because the researcher kept the students to let them produce errors naturally. The researcher did not ask them to avoid making any mistakes, instead, the students could learn the correct ones from doing any mistakes with some comprehensible inputs provided by the researcher. Thus, in weeks 2-3, the students had internalized the patterns and could practice their speaking freely in their communication inside the classroom.

For those provided with structure-based drills, most of the students could repeat and imitate the sentence patterns very well. The researcher asked the students to repeat the patterns until they could repeat the patterns fluently. The students were not suggested to make any mistakes. Thus, when there was a little mistake made by the students, there were also many repetitions followed on it. However, most of the students only comprehended the patterns being practiced. When the researcher instructed them to substitute or transform the sentence, most of them were unable to produce the sentence correctly. There were some missing words (e.g.: to be) in the sentences that made them produce grammatically incorrect sentences.

2. Vocabulary.

Both classes had statistically significant improvement in the aspect of vocabulary. After conducting a teaching-learning process through communicative drills, the students were able to memorize some familiar vocabulary related to the topics. The evidence of mastering the vocabulary could be seen when the students produce their speaking by automatically mentioning the words without asking or finding the proper words in a dictionary. Most of the students could memorize the keywords of a certain context and produce the utterances appropriately. Besides mentioning the words, the students also could demonstrate or refer to the meaning of the words properly. Meanwhile, for those provided with structure-based drills, most of the students were able to memorize and comprehend the words in the patterns. They were able to identify the meaning of the words by substituting the words into a new sentence. They could distinguish the word classes (e.g.: verbs, nouns, or adjectives) by referring to or demonstrating the words in their gestures or expressions.

3. Comprehension.

Both classes had statistically significant improvement in the aspect of comprehension. Most of the students in both classes were able to memorize the sentence patterns and use the sentence by its function. Particularly for the students provided with communicative drills, most of them were able to modify their utterances by understanding the language function (e.g.: asking for something, giving something, or avoiding the request). They could make a sustainable conversation with their friends by having two-way communication between them in a short conversation. On the other hand, for the students provided with structure-based drills, most of them could perform their speaking with a proper production of the sentence by considering its context. Whenever the researcher instructed them to demonstrate speaking with their pairs for a specific topic, they could produce the utterance by comprehending the keywords based on the context. They sometimes transform their sentences regarding their roles in the interaction.

4. Fluency.

By discussing the insignificant improvement in the aspect of fluency, the students provided with communicative drills could not perform their speaking fluently. Since they were merely focusing on producing language in grammatically correct sentences or an intelligible conversation, they mostly used some filler words to help them utter the proper sentences. They used filler words before they found the proper words to express. Besides using some filler words, the students also used the strategy of repair whenever they could not express the sentence intelligibly. Thus, instead of being fluent language users, most of the students did so many repetitions to correct their sentences for the sake of having an intelligible conversation. On the other sides, the students provided with structure-based drills were also unable to perform their speaking fluently. Since they had to memorize the sentence patterns for different contexts, they needed much time to think before speaking. Thus, most of the students could not give an immediate response until they remembered the patterns of the expressions. In addition, whenever the students had a role as a speaker, mostly they needed to

repeat the expressions 2-3 times until they could produce utterances in grammatically correct sentences.

5. Pronunciation.

In the case of discussing the insignificant improvement in the aspect of pronunciation, the students provided with communicative drills were merely being oriented to produce language as intelligible as possible. Thus, their pronunciation was affected by their mother tongue although they had already been exposed to the natives' pronunciation. Meanwhile, for the students provided with structure-based drills, most of them sounded like a native since they were being drilled until they produced zero mistakes in both accuracy and pronunciation. They were drilled by having over-repetition to avoid any mistakes. Thus, most of them were good at pronouncing the words properly.

6. Task.

In the light of discussing the statistically significant improvement in the aspect of the task, the students provided with communicative drills were able to accomplish the task by having much effort into it. They did the tasks by working collaboratively both in pairs and in a group. Besides doing the task during the teaching-learning process online, the students also did the task offline. They were triggered to accomplish the tasks since they were enjoying learning by using the application of WhatsApp Messaging. They were free to communicate with their friends without being controlled by the researcher. Meanwhile, for the students provided with structure-based drills, the insignificant improvement could be explained further since the students were not able to communicate and express their speaking freely. They were unable to do the tasks properly since they got used to doing something based on the given instruction. Thus, they could not carry out the task communicatively since they were being controlled by the researcher's instruction.

Conclusion

In the light of creatively planning the suitable teaching methodology, the primary English teachers are provided with some teaching techniques that advocate the students to learn English optimally. As an alternative solution in providing the techniques to promote speaking achievement for the primary students, this current study had already investigated the use of structure-based drills and communicative drills. These two different techniques had significant differences in improving the students' speaking achievement. The use of communicative drills was more effective to improve students' speaking achievement rather than the use of structure-based drills in certain traits of speaking skills. Both of these techniques are beneficial to give some advantages in improving students' speaking achievement. Moreover, the implementation of communicative drills in the foreign language classroom could improve students' speaking skills in some aspects, they were: as grammar, vocabulary, comprehension, and tasks.

Meanwhile, in the case of implementing structure-based drills, some aspects of speaking skills might improve significantly: vocabulary, comprehension, and pronunciation. In short, the nature of teaching speaking for young learners is

verily different from the case of teaching speaking for adult learners. They are some principles that must be followed as guidance to help teachers decide the appropriate methodology for teaching speaking. To mention a few, the young learners must be firstly oriented to the teaching speaking in which producing language is pivotal rather than studying grammar. However, there was a trend for young learners in the EFL context to study grammar before they were able to speak fluently. Thus, for the sake of achieving a better result in teaching-learning speaking to young learners, there must be a proper curriculum of English teaching for primary students.

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AN OVERVIEW OF REASONING ABILITY IN MATHEMATICS AND MATHEMATICS ACHIEVEMENT OF STUDENTS IN TERTIARY INSTITUTION

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Abstract
The study's goal is to assess students who are enrolled in postsecondary mathematics in terms of their achievement and mathematical reasoning skills. Most experts think that for students to study mathematics, they must possess the ability to reason since solving problems in mathematics demands it. The achievement has a bearing on this since it is important for the school and the instructors to be aware of the academic performance of the pupils in various subject areas to track their progress. A student's accomplishments aid the instructor in determining their rank. The idea that mathematics is the most difficult subject has made learning the subject quite challenging. The ability of mathematics to reason is one significant component of mathematics that many overlook. Mathematical reasoning is crucial for success in the sciences, humanities, and other fields that rely on it. The current study examined math achievement and thinking skills. 228 students served as the study sample for this investigation. The design is expo facto. To direct the study, two research questions were established. According to the study, students' achievement is influenced by mathematical thinking. Additionally, female students outperform male students in math and courses closely related to mathematics.

Keywords: ability, achievement, mathematics, reasoning, students

Introduction
The study of sciences, technology, and other areas that need computations is based on mathematics, which has long been recognized as the mother of all sciences. Mathematics helps people build their critical thinking, creativity, and reasoning skills in addition to helping with calculations (Sujata, 2017, Onoshakpokaiye, 2021a). The transfer of students' past mathematical knowledge is only achievable with the development of higher-order thinking abilities. The study of higher-order thinking abilities might advance existing knowledge of the processes involved in the search for solutions in light of recommendations for greater emphasis on creativity, evidence development, and logical reasoning (Lester, 2013; Tularam, 2013, Tajudin & Chinnappan, 2017). The brain is trained and prepared for reasoning and critical thinking through mathematics. Our daily

transactions require the use of mathematics. Since mathematics is useful in everything we do in our daily lives, no one can live without it. Mathematics is a fundamental subject in the system of education, as stated by George and Charles-Ogan (2019). Due to how prevalent it is in all academic domains and human endeavors, it is essential learning. They went on to state that improving students' computational and logical thinking skills is one of the aims of math teaching in all schools.

To succeed and perform better in math, science, and other courses that need computation, every student must acquire mathematical abilities. It takes experience from the teacher and properly planned training to close this gap, which makes teaching mathematics difficult, according to Onoshakpokaiye(2021b). It has become increasingly challenging for pupils to connect their informal knowledge to mathematical concepts taught in formal education. According to Hendriana, Prahmana, and Hidayat (2018), reasoning is a pattern of cognitive activity that involves drawing a conclusion or stating a new claim based on claims that have been accepted as true in the past. The analytical, inventive, and reasonable reasoning that emphasizes problem-solving ability is all based on a mathematical foundation and loves novelty (Lithner, 2008; Fathurrohman, Porter & Worthy, 2017, Hendriana et al, 2018). Reasoning is the ability to actively utilize one's intellect, the use of logic to confirm facts, and the construction of views based on either new or existing knowledge, according to Kanmani and Nagarathinam (2018). The purpose of the study is to find out whether a student's ability to reason mathematically influences their performance in math and math-related courses. It also examines the mathematical abilities of both male and female students.

Science and math student achievement is getting worse every day. Due to the mathematics or calculation required, the majority of children struggle academically. According to Maduabum and Odili (2006), some students struggle academically because they are uninterested in math. This can be a result of the students' incapacity to study mathematical ideas methodically and with critical thought. According to Ajani (2023) learning mathematics in school is meant to help kids improve their capacity to think, solve problems, and convey information or ideas orally or visually. Due to time constraints, it is regrettable that the majority of secondary school students struggle with mathematical reasoning and that teacher seldom provide the pupils extra attention (Hasanah & Surya, 2017). However, it is essential in the teaching of mathematics that all students are allowed to think critically, analytically, rationally, and creatively.

The few mathematics classes that are provided to students who are not mathematics majors cause some of their anxiety, which in turn has an indirect negative impact on their Grade Point Average (GPA). This might be a result of their capacity for mathematical reasoning. The fact that many students and teachers were not performing as expected may be due to their ignorance of the value of mathematical reasoning to achievement. The researcher needs to determine whether mathematical reasoning skill affects students' performance. Do males perform better than females in mathematics?

Purpose of the study

1. To investigate how math reasoning skills affect students' performance in diploma programs that offer math and math-related courses.
2. To assess the math performance of diploma students doing math and math-related courses, both male and female.

Research questions

To direct the study, the following research questions were posed:

1. Does a student's ability for mathematic reasoning affect their performance in math and math-related courses?
2. Is there a gender difference among diploma students doing math and math-related courses in terms of math achievement?

Reasoning ability in mathematics

According to Sumarmo (2014) in Saleh, Prahmana, Isa & Murni (2018), the reasoning is the method of getting to an orderly conclusion based on relevant data and sources. A student commonly finds ways to suggest answers to these problems and draw a trustworthy conclusion because there are so many challenges to be overcome. This is typically done through mathematical reasoning by carefully examining all relevant data or arguments. For this particular reason, a student's mathematical thinking skills must be taught through a carefully thought-out school curriculum. Sujata (2017) states that reasoning is a type of thinking distinct from ordinary thinking since it entails a series of symbolic actions intended to solve an issue. Sujata (2017) quoted Garrett (1986) who claimed that logic is sequential thinking, which is goal-or purpose-driven.

The instruction of mathematics and teaching mathematical logic are two closely associated tasks that cannot be dissociated since the subject is understood by reasoning and mathematical reasoning is taught through studying mathematics (Ayal, Kusuma, Sabandar & Dahlan, 2016). This demonstrates that mathematical reasoning is a crucial aspect of mathematics since students may answer math problems using their mathematical reasoning. Because thinking is an illustration of mathematical reasoning skills, it is crucial to take this into account when learning mathematics. Mathematics is the only subject that has a significant impact on reasoning rather than memory. Since mathematics is the basis of reasoning and critical thinking skills, mathematics reasoning has a significant impact on children. The ability to think mathematically is one of the crucial skills that contribute to the creation of one's mindset, according to Hendriana et al. (2018). According to Ali (2017), mathematics is a discipline that requires problem-solving abilities. According to Kanmani and Nagarathinam (2018), it is crucial to develop students' mathematical reasoning abilities to provide them with the ability to employ both critical thinking and mathematical skills. Students who are developing their mathematical reasoning can perceive that mathematics is important and makes sense, which aids in their understanding of the subject.

The capacity to work with numbers, calculations, patterns, and logical and scientific thought is known as logical-mathematical intelligence (Lestari, 2019). Reasoning and learning mathematics go hand in hand. Because mathematical reasoning may be understood by understanding mathematical material, and mathematical material can be understood by understanding mathematical

reasoning, the two concepts cannot be separated (Baig & Halai 2006). When attempting to comprehend mathematics or solve mathematical problems, reasoning is the primary and constant method utilized (Napitupulu, 2017). With mathematical reasoning skills, students learn or acquire methods for selecting issues, creating, analyzing, describing, proposing solutions, drawing logical inferences, and determining how the solutions to these problems might be used in academic contexts. To adapt to various life situations and to assess any problems we may run into more critically, comprehensively, and logically, mathematics reasoning skills are necessary for everyday life (Hendriana et al, 2018). Mathematical reasoning ability, according to Saleh, Prahmana, Isa, and Murni (2018), may be characterized as students' capacity to assess the necessity or sufficiency of the facts and any relationships between the arguments and information given to draw reliable conclusions.

According to Oringanji (2013), mathematics helps students become more capable of handling a variety of difficulties, both within and outside of the classroom. For quantitative thinking, mathematics serves as both the foundation and the only language (Fayose & Loyd, 2015). Students that possess mathematical reasoning skills are better able to critically, thoroughly, and logically analyze any problems (Hendriana et al, 2018). Because of this, it helps students, especially those studying disciplines connected to the sciences and mathematics, solve some challenges they might run into while learning. It supports the learning process for the students, allowing them to succeed in their academic endeavors. Given that math contains computations that tax the brain, it is essential for the appropriate development of the students' reasoning, critical thinking, and creative abilities. To close the gap between fundamental skills and higher-order thinking, mathematical reasoning is crucial (Saleh, Prahmana, Isa & Murni, 2018).

According to Kanmani and Nagarathinam (2018), students who respond to mathematics can imitate problem solutions and judge if they make sense. These students are aware of the importance of and how to apply reasoning as a core idea in mathematics. In the area of enhancing students' mathematical reasoning abilities, emphasis should be made on the significance of mathematics as a potent tool for reasoning ability development. The teacher must foster students' mathematical reasoning skills so they can evaluate, approach issues in mathematics, persevere and defend the results if they want students to feel confident and rely on mathematics (Kanmani & Nagarathinam, 2018). Our daily actions require the ability to reason mathematically. They help us pick between options, categorize situations into good and negative ones, and determine how to approach and solve problems (Kanmani & Nagarathinam, 2018).

Mathematics reasoning ability and achievement

Numerous studies have demonstrated that young children who receive instruction in mathematical reasoning are more self-assured, have a deeper understanding of how these skills may be applied in a variety of contexts, and are also more willing to take risks to learn what works and what doesn't (Saleh, Prahmana, Isa & Murni, 2018). Rastogi (1983) claimed in Sujata (2017) that the ability to think mathematically is one element that contributes to low mathematics success. Regarding success in math and other subjects that use math or entail computations, it is quite important. Numerous studies on the relationship between

mathematical aptitude and success have found a strong correlation (Sumangala, 1995 cited in Sujata, 2017). The evidence of a causal link between logical reasoning and mathematical aptitude in primary school students is provided by Nunes et al. (2007). But logical competency was outlined as the application of logical concepts to mathematics, such as understanding one-to-one and one-to-many correspondences, additive composition, and the inverse relationship between addition and subtraction.

Mukherjee's (2012) study of students in the tenth grade to examine the link between academic achievement and students' study habits, personalities, and scholastic aptitude found that reasoning and numerical aptitude had a substantial impact on student's academic success in mathematics. Additionally, it was shown that the best indicators of students' academic progress were their capacity for reasoning and numeracy. Research by Muthumanichan (1992) that indicated a positive association between business performance and reasoning skills was cited by Sujata (2017). According to Saleh, Prahmana, Isa, and Murni (2018), students may understand the problem and have sufficient information to conclude activities of reasoning growth. Ashima, Bhandari, and Rashpalkaur performed a study on the influence of aptitude on the justification of senior secondary students' mathematical success, which was quoted in Kanmani and Nagarathinam(2018). No appreciable disparities in thinking skills between male and female senior secondary pupils were found, according to their research.

In their study on reasoning skills among higher secondary students, Kanimozhi and Ganesan (2017) found a correlation between mathematical achievement and reasoning skills that were positive. Additionally, there was no discernible difference in thinking ability between males and females. A study was conducted by Brunner, Krauss, and Kunter(2007) to look at how German students performed on mathematics-related items. According to their research, the boys outperform the girls in terms of specialized mathematics ability, while the females somewhat outperform the boys in terms of reasoning ability.

Method

An expo-facto design was used in this study to look into the mathematical reasoning skills of diploma students doing math and math-related courses. All the 228 students-133 females and 95 males—who were diploma students taking math and math-related courses at Delta State University in Abraka, Nigeria, made up the study's sample. The diploma program is two years course at completion they are awarded a diploma certificate. The mathematics results of the students were collected and used as the instrument for the study. The results of the students of various units (math and science courses) served as the study's data source. To compare student grades in mathematics and their overall academic performance, the mathematics grades of the students and their Cumulative Grade Point Averages (CGPA) were gathered which also help the researcher to determine their reasoning ability. Simple percentages were used to provide answers to the research questions.

4.50-5.00(Distinction), 3.50-4.49(Credit), 2.40-3.49(Merit), and 1.00-2.39(Pass) are the different grade levels.

Research question 1

Does a student's ability for mathematics reasoning affect their performance in math and math-related courses?

Table 1. Students' mathematics scores and their respective grades in the result

Grades	Students who scored 50% and above	Students who scored below 50%	Total	Percentage
Distinction	-	-	-	-
Credit	38(63.33%)	22(36.67%)	60	100
Merit	26(31.70%)	56(68.29%)	82	100
Pass	22(25.58%)	64(74.41%)	86	100
Total	86	142	**228**	

In Table 1, of the 60 students who received credits, 38 students had scores of 50% or above, while 22 students received scores of 50% or below (63.33% and (36.67%), respectively. In the second row, there were 82 students with Merit grades; 26 of them received 50% or more, while 56 received less than 50%, translating to percentages of (31.70) and (68.29), respectively. There were 86 students in the third row who received Pass marks; of them, 22 students received 50% or more and 64 students received less than 50%.

Research question 2

Is there a gender difference among diploma students doing math and math-related courses in terms of math achievement?

Table 2. Mathematics scores of both male and female students and their percentages

Gender	Students who scored 50% and above	Students who scored below 50%	Total
Female	53(39.84%)	80(60.15%)	133
Male	33(34.74%)	62(65.26%)	95
Total	86	142	**228**

Out of 133 female students, 53 achieved a 50% or higher grade in Table 2, while 80 achieved a 50% or lower grade, with percentages of 39.84 and 60.15, respectively. Out of 95 male students, 33 had scores of 50 or above, while 62 received scores below 50%, with percentages of 34.74 and 65.26, respectively.

Findings and Discussion

According to Table 1 above, 63.33% of the students who received credit had scores of 50 or above. The fact that the pupils performed well (earned credit marks) points to the possibility that their good mathematical reasoning abilities had a role in their achievement. Using Table 1 above as a reference, we also discovered that 22 pupils (or 36.67%) received scores below 50, which may be a result of their shaky mathematical thinking. Only 26 pupils (31.70%) had high mathematical reasoning ability, while 56 students (68.29%) had low mathematical reasoning ability, according to merit marks. There were 64 pupils with poor math aptitude under pass grades, 38 students with excellent math aptitude under credit grades, and 22 students with pass grades.

Table 1 above shows that among students with excellent mathematical ability, the majority of them achieved highly (getting credit grades); 38 of the students received credit grades, which is a significant number compared to other grades (merit and pass) which is supported by Hendriana et al (2018) who stated that students with better mathematical reasoning skills are better able to critically and logically analyze any problems. According to Table 1, only 22 students with scores below 50 earned credit, which may be a result of their poor mathematical reasoning skills. Additionally, according to Table 1, students with scores under 50 are more in the passing grade, indicating that their mathematical reasoning skills are not strong. It can be concluded that students' mathematical reasoning ability contributes to their achievement in mathematics and mathematics-related courses. Because 64 of them obtained scores below 50, indicating that these students' mathematical reasoning abilities are low. This finding is consistent with the findings of Kanimozhi and Ganesan (2017), who found a correlation between mathematical achievement and reasoning ability.

Due to their mathematical reasoning skills, more students (38), as opposed to just 22 students, received credit grades under the credit system. Although those who scored above 50 are less than those with low mathematics ability for merit grades, when we thoroughly examined the table, we found that students with little mathematical reasoning ability slant towards the pass grades. Fewer students obtained 50 or higher compared to those that scored below 50 in the passing grades.

The majority of the passed students' scores were below 50, indicating that their mathematical reasoning was weak. This is in line with Rastogi (1983) in Sujata (2017), who claims that one factor contributing to students' poor mathematical achievement is weak mathematical reasoning ability. Twenty-two (22) students had high mathematical aptitude, as evidenced by their scores above 50. We can also notice that 64 students with scores below 50% obtained tests whereas 38 students with scores over 50% received credit marks by comparing the credit and pass grades. This implies that students' success is influenced by their capacity for mathematical thought. Students with scores below 50 may be more likely to receive passing marks since they have weaker mathematical thinking abilities. It can be concluded that mathematical reasoning skill affects or contributes to students' achievement in mathematics and mathematics-related courses. Since mathematics is the foundation of reasoning, a student's ability to reason in that subject will be impacted if it is not developed.

According to Table 2, 53 female students had grades above 50%, while 80 female students received grades below 50%. 33 male students scored 50% and above, while 62 fell below it. Comparing the percentages of male and female students, it can be seen that students who achieved a score of 50 or above were 53 (39.94%) for girls and 33 (34.74%) for boys. Girls who received a score below 50% were 80 (60.15%), while boys received 62 (65.76%). In mathematics and courses connected to mathematics, it can be concluded based on the proportions of both boys and girls that females do better than males.

Table 2 shows that 80 of the female students scored below 50%, whereas 53 of them did better. For male students, 33 students received scores greater than 50%, while 62 students received scores below 50%. Comparing the percentages of male and female students, it can be seen that students who scored above 50 were

53 (39.94%) among girls and 33 (34.74%) among boys. The number of females who received a score below 50% was 80 (60.15%), whilst the number of males was 62 (65.76%). According to the percentages of both males and females, it can be concluded that females outperform males in mathematics and courses connected to mathematics which is contrary to the study conducted by Brunner, Krauss, and Kunter (2007), according to them the boys outperform the girls in terms of specialized mathematics ability, while the females somewhat outperform the boys in terms of reasoning ability.

Conclusion

Since no student can thrive in mathematics without it, developing the learner's mathematical reasoning skills is extremely important. Due to their weak mathematical skills, many students frequently have trouble solving mathematical issues. To help their students acquire better reasoning ability, teachers must motivate them and carefully prepare their lectures. From the study, we discover that the majority of the students with excellent mathematical abilities achieved better. While students with low mathematical reasoning skills achieve poorly in math which suggests that mathematical reasoning ability influences students' achievement in math. The study found that female students do better in mathematics and courses connected to mathematics and that students' achievement is influenced by their ability to think mathematically.

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UNDERGRADUATE ENGINEERING STUDENTS' ATTITUDE TOWARDS THE USE OF PHYPHOX IN PHYSICS EXPERIMENT

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Abstract
During the pandemic, the faculty of engineering at Trisakti University still used old apparatus and onsite learning in practical lectures, albeit with some COVID restrictions. Nowadays, when the pandemic is going out the faculty is trying to implement a new method in practical lectures using a smartphone-based application to enhance the effectiveness of physics experiments. This research aims to discover the students' attitudes toward the use of Phyphox in physics experiments and to examine the differences in the attitude between students with various backgrounds, such as gender, department, smartphone use, and prior experience. Two hundred self-developed questionnaires were delivered to seven departments in the faculty of engineering that have participated in this research. The findings indicated that: gender correlated to significant differences in some factors of attitude; smartphone use did not affect attitude; students with prior experience showed more positive attitude; and the major taken by students correlated with majority of factors of attitude towards the use of Phyphox in physics experiment. This research article presents a case study of the integration of the Phyphox application, that utilises the smartphones' integrated sensors in hands-on physics experiments, in an inquiry framework.

Keywords: attitude, Phyphox, smartphone-based application

Introduction
The quality of education can be enhanced by science and technology, which is one of the contributing factors. As a result, we are now well-acquainted with the internet and a range of digital devices, such as computers, laptops, tablets, smartphones, and other similar technologies. The Global Education Census discovered that Indonesian students frequently use technology in the classroom to a greater extent than many other countries, sometimes even outperforming more advanced nations. This statement is supported by data from Cambridge

Assessment International Education (2018) which stated that Indonesian students are the highest globally in their use of IT suites or computer rooms (40%). They are also the second-highest in the world for using desktop computers (54%), behind only the USA.

The usage of technology in the classroom has the potential to facilitate physics practical activities for students and make them more accessible and engaging. With the emergence of the COVID-19 (Coronavirus Virus Disease) outbreak learning technology became more vital than ever, especially when the Indonesian government issued a Work from Home (WFH) policy. People need learning technology to strengthen online learning (Wahyudi et al., 2022). One of the technologies that can be used to facilitate learning activities is the smartphone sensor application (Nazruddin, 2012).

Smartphones as special new media devices serving as tools for conducting experiments in classroom physics and daily life as well (Kuhn & Vogt, 2017). The smartphone is also a durable and multifaceted device that can precisely, conveniently, and consistently gauge physical quantities such as magnetic fields, acceleration, and angular velocity. On one hand, smartphone sensors create an opportunity to introduce a new paradigm in physics pedagogy (Shakur & Kraft, 2016). It also permits educational institutions to have low-cost laboratories and allows the students to make measurements of physical phenomena outside the teaching laboratories. Furthermore, Listiaji et al. (2020) compared an oscillation experiment using a video tracker and smartphone acceleration sensors and found that experiments using smartphone acceleration sensors obtain more precise results.

On the other hand, by using smartphones learning is being included as a routine aspect of the students' daily activities. They can use their devices to find out how the concepts learned in the classroom apply to their lives (Gonzalez et al., 2014). Shakur and Kraft (2016) also found that students take enormous pride in the data generated by their smartphones and are excited and motivated to learn from them.

With that being said, learning activities using smartphone sensor technology is getting more popular in Indonesia, using Phyphox (Physical Phone Experiments) as one of the application. This application provides a simple way of utilizing modern smartphone sensors for Android and iOS operating systems. In a study, Palacio et al. (2013) found success in demonstration and experiments using a smartphone sensor in the general physics laboratory. They use mobile phone accelerometers to study two-dimensional motions on an air table and various types of pendulum motions (Palacio et al., 2013).

Thus, this research aims to determine the attitude of undergraduate engineering students towards the use of Phyphox in physics experiments as well as determine the level of satisfaction with Phyphox application during experiments or lectures. The research questions are as follows:

1. What are undergraduate engineering students' attitudes towards the use of Phyphox in physics experiments?
2. Are there any differences in attitude towards the use of Phyphox in physics experiments on students with various backgrounds?

Students' attitude

Although many studies have investigated students' attitudes toward science, there is no common definition of "attitude" (Kind et al., 2007; Osborne et al., 2003). Attitude toward learning science has been a well-researched domain for more than four decades (Chua & Karpudewan, 2017). Osborne et al. (2003) defined attitude as feelings, beliefs, and values held about an object that might be the enterprise of science, school science, and the impact of science on society or scientists themselves. Other researchers have claimed that attitude concerns emotional feelings such as good or bad, pleasant or unpleasant (Kind et al., 2007). According to Reid (2006), attitudes have interrelated cognitive, affective, and behavioral components. He defined the cognitive component as knowledge about an object, event, or concept, the affective component as feelings or emotions (e.g., like or dislike) about an object, and the behavioral component as behavior based on a person's attitude toward an object or an event (Reid, 2006). Young (1998) also emphasized the affective aspect of attitudes and stated that this is long-lived and related to behavior.

In short, attitude relates to the degree to which a person perceives something as important and believes that others should perceive so. Attitude is also a personal factor that refers to one's positive or negative judgment about a concrete subject. In this study, students' attitude is defined as one's perception of self, combined with beliefs and emotions in using a learning media, in this case, Phyphox, which constitutes the affective domain of a student. However, some external variables related to the learning system and student characteristics may also affect students' decision to either accept or reject a technology itself in a lesson (Matyokurehwa et al., 2020).

Some researchers argued that achievement as well as the nature of instruction are key factors, that affect students' attitudes towards science subjects and vice versa (Simpson & Oliver, 1990). Attitude is defined as a mental and emotional entity that characterizes a person's actions or thoughts toward a subject (Perloff, 2016). Moreover, a few studies that explore distinct emotional areas in science education have demonstrated a strong correlation between a student's attitude and academic performance in a particular subject.

Attitude, which is part of the affective domains, has been thoroughly studied in modern science for many decades. This is due to the strong correlation between attitude and other factors such as science learning, achievement, and even interest in pursuing science-related careers. Kapici et al. (2020) stated that students' interest in science has decreased dramatically, and careers related to science and technology have become less attractive in recent decades. Furthermore, the environment in which students do laboratory experiments can also influence their attitudes toward the application itself. As Penn & Mavuru (2020) state, laboratory experimentation is a worthy tool to enhance not only students' attitudes but also their procedural and conceptual understandings of science concepts in general. Thus, students' attitude towards the use of Phyphox is a key factor that encourages their interest in learning science through experiments. Several factors known to impact students' attitudes toward the use of Phyphox are researched in this paper, such as gender, smartphone type, major taken by students (department), and prior experience of using Phyphox.

Phyphox

The name of the application, Phyphox, is an acronym for "Physical Phone Experiments". The app has been accessible on both the Google Play Store and Apple App Store since September 2016. Kousloglou et al. (2022) mention that Phyphox uses the phone's built-in sensors, such as an accelerometer, magnetometer, gyroscope, etc. Furthermore, Phyphox tools offer remote access via a laptop or another digital mobile device and can export data in Excel-compatible format so that data can be processed to produce graphs (Kousloglou et al., 2022).

The usefulness of Phyphox has been acknowledged in many scientific articles. The application contains a lot of experiments that are built in (Figure 1). Also, Phyphox is an open-source application that provides limitless experiments beyond the built-in ones, allowing students and teachers to utilize raw data in creative and innovative ways, even connecting it to Arduino. The Phyphox application can be used for various learning models and is practically used as a laboratory. The app can also remotely connect to a personal computer to provide live data at a distance (Carroll & Lincoln, 2020). In conclusion, experiments using the Phyphox application can make students independent in experimenting (Mayampoh et al., 2020)

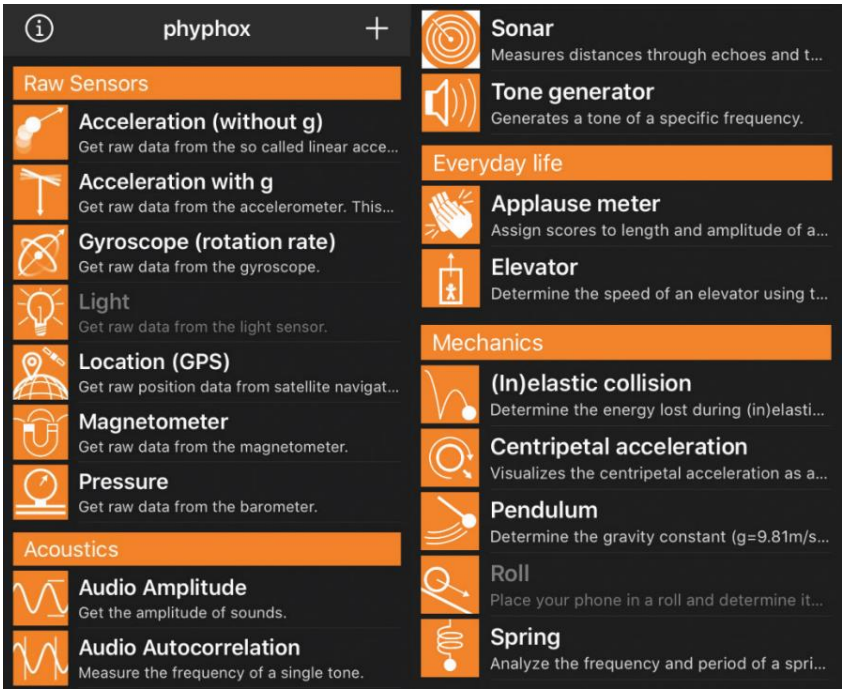

Figure 1. The main interface of the Phyphox app

Physics experiment

Physics is a science that studies very external aspects ranging from simple things to covering the universe, where it requires a critical, innovative, and creative thought process. This action, of course, requires adequate learning support, which is, of course, to create interactive and exciting learning for students. In this case, of course, the role of technology is very influential in increasing understanding of the learning concepts presented to achieve maximum learning

outcomes and learning achievement (Supardi et al., 2015). Therefore, this aspect aims to provide a theory of extension or specification of environment-based learning (aspects that exist today: thematic, episodic, social) (Kuhn et al., 2011).

Physics is a subject that combines theoretical concepts with practical experiments and mathematical analysis. Physics investigates the existing phenomena and subsequently formulates them into physical principles, which are then developed into laws or theories, and tested or verified through experiments. Experimental activities can provide an enjoyable and friendly way for students to gain, integrate, and construct knowledge. Therefore, experimental or laboratory activities have an important role at all levels of education (Ilmi et al., 2021)**.** With the development of technology, lab practices are designed to cover different Physics areas and open the door to students to carry out their experiments at home by exploiting the technology implemented in their smartphones. The different sensors available in smartphones are useful tools for possible applications in experimental measurements and scientific demonstrations (Sans et al., 2015).

Method

The faculty of engineering at Trisakti University has implemented Phyphox as a new medium for practical activities pertaining to physics-related material. This research aimed to identify the attitude of undergraduate engineering students toward the use of Phyphox in physics experiments and determine the different students' attitudes with various backgrounds. In this study, participants are undergraduate engineering students from Trisakti University in Indonesia which are separated into seven departments, industrial engineering, mechanical engineering, electrical engineering, mine engineering, geological engineering, environmental engineering, and civil engineering. Those departments have introductory physics experiment course in the first and second year which is included in the university's curriculum.

For collecting data, a self-developed questionnaire for surveying was used as the main data-gathering instrument with two distinct sections. The first section collected information on the participants' backgrounds, while the second section was formulated to obtain and collect their attitudes toward the use of Phyphox. Four participants' backgrounds were developed to recognize the differences of each participant, while ten five-point Likert scale questions were advanced to identify the uses of Phyphox in the physics experiment. To ensure that the participants were eligible to respond to the research question, we opted to disseminate this questionnaire through an online platform to the faculty of engineering, at Trisakti University, Indonesia.

The questionnaire's validity was established through content validation, wherein the draft was evaluated by two lecturers and two teachers to guarantee the accuracy, comprehensiveness, non-overlapping nature, and ability to measure what was claimed. To ascertain reliability, Cronbach's alpha was employed, resulting in a score of .956 for the attitude toward Phyphox utilization. This score surpassed the .7 threshold, indicating an exceptionally high level of internal consistency for the questions.

The major software package for analyzing the data was Statistical Package for the Social Science (SPSS) version 24.0. Cronbach's alpha was first utilized to ensure the internal consistency or reliability of the questionnaire, and then, mean

and standard deviation were utilized to illustrate the attitude of undergraduate engineering students toward the use of Phyphox in physics experiments. Lastly, an independent sample t-test and one-way ANOVA were adopted to measure the difference in attitude scores related to the use of Phyphox among students with various backgrounds.

To secure a high response rate, an experiment was conducted wherein students initially performed a mainstream experiment in a physics laboratory without the application of Phyphox. Following this, one month later, the same students executed a similar experiment using Phyphox on the same topic. The questionnaires were delivered to respondents in the classroom by the lecturers, collected, and subsequently mailed to the teachers (colleagues). The data was compiled and organized into a designated folder to be processed.

Out of the 200 questionnaires distributed, 185 valid questionnaires were returned, resulting in a response rate of 92.5%. The respondents consisted of 82 males and 103 females. Among them, 67 participants used an iPhone, while 118 participants used an Android operating system on their smartphones. Additionally, 49 participants studied industrial engineering, 18 participants studied mechanical engineering, 18 participants studied electrical engineering, 35 participants studied mining engineering, 12 participants studied geological engineering, 26 participants studied environmental engineering, and 27 participants studied civil engineering. Lastly, 54 participants reported having tried using the Phyphox application in a practical activity or another physics-related activity, while 131 participants had not.

Findings

This research focused on identifying the most important of utilizing Phyphox. The following section presents the findings related to the use of Phyphox and the differences in attitudes among students.

Use of Phyphox

As illustrated in Table 1, our research finding indicated that undergraduate engineering students highly recognized the use of Phyphox in physics experiments. The item "students are interested in using the Phyphox application for other practical activities" obtained the highest score of 4.24, followed by "the titles of content in the Phyphox application are well structured so that students can distinguish the types of experiment" and "students can retrieve accurate experiment data using the Phyphox application", with the same score of 4.19, respectively. Meanwhile, "students did not find any technical problems such as crashes, stuttering, loading, or hangs when using the Phyphox application" and "students do not need any special technology skills to use the Phyphox application" were comparatively less recognized as the use of Phyphox by students.

Table 1. Use of Phyphox in a physics experiment

Factors		Mean	SD
1.	Students are motivated to carry out practical activities using the Phyphox application.	4.14	.813
2.	Students are interested in using the Phyphox application for other practical activities.	4.24	.799

3.	Students prefer doing experiments using the Phyphox application compared to conventional measuring instruments.	4.08	.853
4.	The measurement results in data in the form of graphs and tables are of good quality (the scale and numbers are legible)	4.16	.777
5.	The graphs and tables downloaded from the Phyphox application help students understand physics concepts.	4.14	.813
6.	All navigation and menus in the Phyphox application are easy to operate.	4.12	.774
7.	The titles of content in the Phyphox application are well structured so that students can distinguish the types of experiments.	4.19	.837
8.	Students can retrieve accurate experiment data using the Phyphox application.	4.19	.775
9.	Students do not need any special technology skills to use the Phyphox application.	4.01	.921
10.	Students did not find any technical problems such as crashes, stuttering, loading, or hangs when using the Phyphox application.	4.03	.850

Different attitudes of students toward on use of Phyphox

We were focused on identifying differences in attitude among students with diverse backgrounds. The different attitude of students towards on use of Phyphox is presented in Table 2 and Table 3. An independent-sample t-test was performed to compare the effect of gender, type of smartphone, and prior experience as presented in Table 2. First of all, male students indicated a greater degree of opinion than female students on "the titles of content in the Phyphox application are well structured so that students can distinguish the types of experiment" (t-value = 2.15; sig = .033).

Another interesting finding is that male students indicated a greater degree of opinion that they can retrieve accurate experiment data using the Phyphox application (t-value = 2.01; sig = .045), while also thinking that they do not need any special technology skills to use the Phyphox application (t-value = 2.13; sig = .035). This finding may indicate that male students possess better technical skills in measuring physical quantity using Phyphox. However, no difference in attitude was found in students who use different types of smartphones. These findings carry significance as it was assumed that many students decided not to opt for the Phyphox application in their physics experiment because they had different types of operating systems on their smartphones.

Furthermore, students with prior experience in using the Phyphox application showed that they are more motivated to carry out practical activities using the Phyphox application (t-value = 2.36; sig = .020), They also show higher preference in doing experiments using the Phyphox application compared to conventional measuring instruments (t-value = 3.92; sig = .000), and think that the measurement results data in the form of graphs and tables are of good quality (the scale and numbers are legible) (t-value = 3.03; sig = .003).

Moreover, students with prior experience are also of the higher opinion that the graphs and tables help them to understand physics concepts (t-value = 3.64; sig = .000), navigation and menus are easy to operate (t-value = 3.28; sig = .001), and the contents are well structured that they can distinguish the types of the

experiment (t-value = 3.69; sig = .000). They are also of the higher opinion that they can retrieve accurate experiment data using the application (t-value = 3.16; sig = .002) without any special technology skills to use it (t-value = 4.10; sig = .000), and without finding any technical problems when using it (t-value = 3.99; sig = .000).

However, both students with and without prior experience show high interest in using the Phyphox application for other practical activities, i.e. no significant difference is found. This result indicates that prior experience does not affect the students' interest in using the Phyphox application, since students' overall attitude in using the Phyphox application is positive.

Table 2. Result of t-test on attitude variances among students

Factors	Gender 1 Male 2 Female	Smartphone 1 iPhone 2 Android	Prior Experience 1 Yes 2 No
1. Students are motivated to carry out practical activities using the Phyphox application.			t = 2.36* 1 > 2
2. Students are interested in using the Phyphox application for other practical activities.			
3. Students prefer doing experiments using the Phyphox application compared to conventional measuring instruments.			t = 3.92*** 1 > 2
4. The measurement results data in the form of graphs and tables are of good quality (the scale and numbers are legible).			t = 3.03** 1 > 2
5. The graphs and tables downloaded from the Phyphox application help students to understand physics concepts.			t = 3.64*** 1 > 2
6. All navigation and menus in the Phyphox application are easy to operate.			t = 3.28** 1 > 2
7. The titles of content in the Phyphox application are well structured so that students can distinguish the types of experiments.	t = 2.15* 1 > 2		t = 3.69*** 1 > 2
8. Students can retrieve accurate experiment data using the Phyphox application.	t = 2.01* 1 > 2		t = 3.16** 1 > 2
9. Students do not need any special skills in technology to use the Phyphox application.	t = 2.13* 1 > 2		t = 4.10*** 1 > 2
10. Students did not find any technical problems such as crashes, stuttering, loading, or hangs when using the Phyphox application.			t = 3.99*** 1 > 2

Moving on, a one-way ANOVA was carried out to compare the effect of seven departments in the faculty of engineering to the students' attitude as illustrated in Table 3. We found that industrial engineering students show significant differences in attitude compared to other engineering students in all factors, except "Students prefer doing experiments using the Phyphox application compared to conventional measuring instruments", "The graphs and tables downloaded from the Phyphox application help students to understand physics concepts", "Students do not need any special technology skills to use the Phyphox application", and "Students did not find any technical problems such as crashes, stuttering, loading, or hangs when using the Phyphox application". In those four factors, there is no significant difference in attitude between students of different engineering courses.

Using one-way ANOVA, it is also revealed that there are at least two groups with significant differences in the following four factors: "Students are motivated to carry out practical activities using the Phyphox application" ($F(6, 178) = [2.72]$, $p = .015$), "Students are interested in using the Phyphox application for other practical activities" ($F(6, 178) = [2.46]$, $p = .026$), "The titles of content in the Phyphox application are well structured so that students can distinguish the types of experiment" ($F(6, 178) = [2.67]$, $p = .017$), and "Students can retrieve accurate experiment data using the Phyphox application" ($F(6, 178) = [3.26]$, $p = .005$).

It is also revealed using one-way ANOVA, that there are at least three groups with significant differences in the following two factors: "The measurement results data in the form of graphs and tables are of good quality (the scale and numbers are legible)" with score ($F(6, 178) = [3.36]$, $p = .004$), and "all navigation and menus in the Phyphox application are easy to operate" with score ($F(6, 178) = [4.09]$, $p = .001$).

Furthermore, using Tukey's HSD (Honestly Significant Difference) Test for multiple comparisons we found in all six factors that industrial engineering students show significant differences with students from electrical engineering, mine engineering, environmental engineering, and civil engineering. Industrial engineering students show a significant difference compared to electrical engineering in "students are motivated to carry out practical activities using the Phyphox application" ($p = .026$, 95% C.I. = [-1.35, -.05]), with post hoc comparisons indicating mean score for electrical engineering ($M = 3.67$, $SD = .97$) that was significantly different than industrial engineering ($M = 4.37$, $SD = .81$).

Industrial engineering students also show a significant difference compared to civil engineering in "students are interested in using the Phyphox application for other practical activities" ($p = .032$, 95% C.I. = [-1.15, -0.03]). Post hoc comparison shows a significant difference in mean score for industrial engineering ($M = 4.55$, $SD = .74$) and civil engineering ($M = 3.96$, $SD = .71$).

Tukey's HSD Test for multiple comparisons found that in "the measurement results data in the form of graphs and tables are of good quality (the scale and numbers are legible)" there were significant differences between mine engineering and industrial engineering ($p = .008$, 95% C.I. = [-1.09, -.10]), also between civil engineering and industrial engineering ($p = .041$, 95% C.I. = [-1.08, -.01]). Post hoc comparisons using the Tukey HSD test indicated that the mean score for industrial engineering ($M = 4.51$, $SD = .68$) was significantly different than mine engineering ($M = 3.91$, $SD = .74$) and civil engineering ($M = 3.96$, $SD = .76$).

With the same Tukey's test, we also found that "all navigation and menus in the Phyphox application are easy to operate" were significantly different between mine engineering and industrial engineering (p = .017, 95% C.I. = [-1.03, -.06]), also between environmental engineering and industrial engineering (p = .007, 95% C.I. = [-1.18, -.11]). Post hoc comparisons using the Tukey HSD test indicated that the mean score for industrial engineering (M = 4.49, SD = .71) was significantly different than mine engineering (M = 3.94, SD = .77) and environmental engineering (M = 3.84, SD = .61).

Moreover, industrial engineering students show significant difference compared to electrical engineering in "students are motivated to carry out practical activities using the Phyphox application" (p = .026, 95% C.I. = [-1.35, -.05]), with post hoc comparisons indicating mean score for electrical engineering (M = 3.67, SD = .97) that was significantly different than industrial engineering (M = 4.37, SD = .81).

Industrial engineering students show significant difference compared to environmental engineering students in "the titles of content in the Phyphox application are well structured so that students can distinguish the types of experiment" (p = .016, 95% C.I. = [-1.25, -.07]), with post hoc comparisons indicated mean score for environmental engineering (M = 3.85, SD = .78) that was significantly different than industrial engineering (M = 4.51, SD = .68).

Lastly, using Tukey's HSD Test for multiple comparisons also found that "students can retrieve accurate experiment data using the Phyphox application" was significantly different between mine engineering and industrial engineering (p = .037, 95% C.I. = [-1.00, -¬.02]). Post hoc comparisons using the Tukey HSD test indicated that the mean score for mine engineering (M = 4.00, SD = .73) was significantly different than industrial engineering (M = 4.51, SD = .71).

Table 3. Result of ANOVA on attitude variances among students

	Factors	Departments	F	Post Hoc
1.	Students are motivated to carry out practical activities using the Phyphox application.	(1) Industrial Engineering (2) Mechanical Engineering (3) Electrical Engineering (4) Mine Engineering (5) Geological Engineering (6) Environmental Engineering (7) Civil Engineering	2.72*	1 > 3
2.	Students are interested in using the Phyphox application for other practical activities.	(1) Industrial Engineering (2) Mechanical Engineering (3) Electrical Engineering (4) Mine Engineering (5) Geological Engineering (6) Environmental Engineering (7) Civil Engineering	2.46*	1 > 7
3.	Students prefer doing experiments using the Phyphox application compared to conventional measuring	(1) Industrial Engineering (2) Mechanical Engineering (3) Electrical Engineering (4) Mine Engineering (5) Geological Engineering (6) Environmental Engineering	1.59	

	instruments.	(7) Civil Engineering		
4.	The measurement results data in the form of graphs and tables are of good quality (the scale and numbers are clearly legible)	(1) Industrial Engineering (2) Mechanical Engineering (3) Electrical Engineering (4) Mine Engineering (5) Geological Engineering (6) Environmental Engineering (7) Civil Engineering	3.36**	1 > 7 1 > 4
5.	The graphs and tables downloaded from the Phyphox application help students to understand physics concepts.	(1) Industrial Engineering (2) Mechanical Engineering (3) Electrical Engineering (4) Mine Engineering (5) Geological Engineering (6) Environmental Engineering (7) Civil Engineering	2.84	
6.	All navigation and menus in the Phyphox application are easy to operate.	(1) Industrial Engineering (2) Mechanical Engineering (3) Electrical Engineering (4) Mine Engineering (5) Geological Engineering (6) Environmental Engineering (7) Civil Engineering	4.09**	1 > 4 1 > 6
7.	The titles of content in the Phyphox application are well structured so that students can distinguish the types of experiment.	(1) Industrial Engineering (2) Mechanical Engineering (3) Electrical Engineering (4) Mine Engineering (5) Geological Engineering (6) Environmental Engineering (7) Civil Engineering	2.67*	1 > 6
8.	Students can retrieve accurate experiment data using the Phyphox application.	(1) Industrial Engineering (2) Mechanical Engineering (3) Electrical Engineering (4) Mine Engineering (5) Geological Engineering (6) Environmental Engineering (7) Civil Engineering	3.26**	1 > 4
9.	Students do not need any special skills in technology to use the Phyphox application.	(1) Industrial Engineering (2) Mechanical Engineering (3) Electrical Engineering (4) Mine Engineering (5) Geological Engineering (6) Environmental Engineering (7) Civil Engineering	1.63	
10.	Students did not find any technical problems such as crashes, stuttering, loading, or hangs when using the Phyphox application.	(1) Industrial Engineering (2) Mechanical Engineering (3) Electrical Engineering (4) Mine Engineering (5) Geological Engineering (6) Environmental Engineering (7) Civil Engineering	1.84	

Discussion

The objective of this research was to identify the major attitude of using Phyphox application in physics practical activity in the faculty of engineering, at Trisakti University, Indonesia. The research findings showed that, in general gender does not correlates with students' attitude towards the use of Phyphox in physics experiment. Gender only has a significant difference in three out of ten factors of attitude in this research. It should be noted that the three factors were related to the technical aspect of using Phyphox and retrieving data from it.

Similarly, the types of smartphones owned by the students also do not correlate with students' attitudes. This might indicate that the Phyphox application has been designed to run on iOS and Android OS properly. However, it should be noted that the accuracy and precision of Phyphox experiment data depend entirely on the hardware aspect of the smartphone, which we did not take into account in this research.

Moving on, the result shows that students with prior experience in using Phyphox show an overall higher score of attitude compared to students without prior experience. This finding might indicate that the more students use Phyphox in learning, the better their attitude towards it. It should be noted that students' interest in using Phyphox is not significantly different among students with different prior experiences, which is all positive.

Lastly, we found that students' course background relates to some of the factors of attitude in using Phyphox. Out of seven departments of engineering students, five show significant differences in attitude. We found that, in most factors of attitude, industrial engineering students show a significantly higher attitude towards the use of Phyphox in a physics experiment.

Conclusion

Just like how different people use smartphones differently, different students also have different attitudes toward the use of Phyphox. The research found that gender and the type of smartphone owned by the students did not significantly affect the students' attitudes towards using Phyphox in physics experiments. However, the research revealed that students with prior experience in using Phyphox showed a higher overall attitude score compared to students without prior experience.

Additionally, students' course background was found to relate to some of the factors of attitude in using Phyphox, with industrial engineering students showing significantly higher attitudes towards the use of Phyphox in physics experiments compared to students of other engineering departments. Further research is needed to determine what makes industrial engineering students stand out compared to students in other engineering departments.

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