Improving Holistic Learning Outcomes through Learner-centred Pedagogies in Tanzania

A Schools2030 Research Project

November 2023

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Contents

List of Tables

List of Figures

Annexes

- Annex 1: The Full Psychometric Report of the Contextualised SEL Tool
- Annex 2: The Contextualised SEL Tool

Chapter 1: Background

1.1 Introduction

This report presents the results of a cross-sectional observation study of the state of holistic learning outcomes (i.e., literacy and culturally defined social-emotional learning skills) and teaching pedagogy among Grade 4 students and teachers across sampled schools in four districts in Tanzania where human-centred design thinking (HC-DT) and play-based learning (PBL) programming are being implemented. In collaboration with a local researcher from the University of Dar as Salaam, primary data on Grade 4 students' literacy, social-emotional learning (SEL) skills, and teachers' pedagogical practices in schools in Temeke, Lindi, Tarime, and Serengeti districts were collected in May 2023 as part of the Right To Play-led consortium Schools2030 research project in Tanzania for the period of June 2021 to October 2023.

In-service teacher professional development training in play-based learning pedagogy for schools and teachers in Serengeti and Tarime started in October 2020 and completed in February 2023 under the NORAD-funded Enhancing Quality and Inclusive Education (EQIE) project. This project is being implemented by Right To Play Tanzania in the two districts to improve teaching practices and learning outcomes (i.e., literacy and SEL) for students in Grades 1 to 4 and their teachers. This is part of a larger five-year quality and inclusive education programme across 212 schools in five countries.

The Aga Khan Foundation-led Schools2030 programme is a ten-year participatory learning improvement programme based in 1,000 government schools across 10 countries. It is centred on supporting teachers and students to design and implement education micro-innovations to improve holistic learning outcomes. In Tanzania, the programme is being implemented in 100 learning sites (30 pre-primary classrooms, 30 Grade/standard 4 classrooms, 30 secondary school classrooms, and 10 out-of-school youth groups). Professional development training in human-centred design started in August 2021 through to July 2023. It must be noted, however, that some schools are yet to receive human-centred design training, and the implementation of designed solutions is still ongoing.

Using adapted EGRA from the Tanzania official subtasks and the locally developed context-relevant SEL tool, the literacy and SEL skills assessment was administered to 807 students in Grade 4 in 40 schools (10 schools in each of the four districts). The aim was to assess the skill level of primary school children in Grade/standard 4 in schools where the two learner-centred pedagogical strategies (i.e., human-centred design thinking and play-based learning) are being implemented in comparison to that of school children in other schools within the districts not implementing these pedagogies (i.e., "business-as-usual" or BAU schools).

While the AKF-S2030 programme had worked with stakeholders in the two districts to develop contextualised SEL tools whose domains are *creativity, problem solving, and self-awareness*, this research project followed a separate process to ethnographically develop culturally relevant skills that fairly represent local education stakeholders' aspirations and values in the contextually diverse (rural, urban, religious) settings of the four districts, and which can directly be assessed with the students themselves on a scale of 1-5. This process resulted in three SEL domains: *collaboration, hard work, and respect,* on which students were assessed and the findings in this research report are based. It must therefore be noted that none of the pedagogical programmes were set up or designed from the start to specifically work with students in the development of these three SEL skills.

The holistic skills assessment instrument included an individually administered timed non-word reading test, an oral reading passage, and an untimed reading comprehension to orally assess Grade 4 students' foundational skills in reading. It also included an untimed self-reported assessment of students' SEL skills in three contextually identified skill domains: *collaboration, hard work, and respect*.

Background characteristics such as sex, age, district/geographic location, household size, access to learning materials at home, household assets (a proxy for socio-economic status), and household risk factors that may impact children's skills development were also collected to allow for a deeper and richer analysis of factors influencing student learning outcomes.

Based on a review of the literature on human-centred design thinking and play-based learning and in adopting constructs from the LEGO Foundation's PLAY Observation tool, a pedagogical assessment tool was developed to observe the state of teaching strategies implemented in schools across the four districts. A total of 20 schools (five schools from each of the four districts) were sampled. There, trained and experienced professionals observed 45-minute literacy/language lessons taught by Grade 4 teachers. Teacher background information, such as sex, professional qualifications, and class size were collected.

1.2 Research Questions

This study aims to answer the following research questions:

- What is the state of pedagogical practice of Grade 4 teachers in schools across the four districts?
- What is the status of holistic learning outcomes (early grade literacy skills and SEL skills) among Grade 4 children in the Temeke, Lindi, Tarime, and Serengeti districts, where pedagogical programmes of human-centred design thinking and play-based learning are being implemented?
- How do children's holistic learning skills differ based on sex, age, and learning differences (i.e., attention and memory issues)?

1.3 Limitations

Using a cross-sectional observational study, with data collected at a single point in time to examine the state and relationship between teaching practices and learning outcomes, has several limitations and must be noted in the interpretation of the findings of this study. The key limitations include:

- **Causality**: Cross-sectional studies are limited in their ability to establish causal relationships between variables. Since data is collected at a single point in time, it is challenging to determine the direction of causality. For example, it may be unclear whether effective teaching practices lead to better learning outcomes, or vice versa. Therefore, the analysis aims to establish only correlational relationships and does not in any way attempt to establish causality. Inference from the findings is therefore limited. However, in our analysis, we capture the variability in the relationship between teaching practices and learning outcomes over different contexts (i.e., urban and rural districts) and groups (programme exposure and gender).
- **Temporal Order**: The lack of temporal order in cross-sectional studies means that any observed associations between teaching practices and learning outcomes may be subject to

reverse causality. Learning outcomes may influence teaching practices rather than the other way around.

- **Selection Bias**: Cross-sectional studies may suffer from selection bias, as the sample may not be representative of the entire population, or it may be influenced by self-selection biases. In this study, the exposure groups (DTA, PBL) and non-exposure group (the control group) were not randomised or even intentionally assigned to treatment based on any comparable baseline observable characteristics. This can limit the generalizability of the findings.
- **Lack of Longitudinal Data**: Cross-sectional studies do not collect data over time, which means they cannot capture changes or trends in teaching practices and learning outcomes. Longitudinal studies are better suited to assess how these variables evolve.
- **Confounding Variables**: Cross-sectional studies may not adequately control for confounding variables that could influence the relationship between teaching practices and learning outcomes. Without accounting for these variables, it becomes difficult to attribute changes in outcomes solely to teaching practices.

Chapter 2: Methods

2.1 Study Design

The study follows a cross-sectional observational design with data collected at a single point in time to examine the state and possible correlational relationships between the two strands of learner-centred pedagogical strategies and learning outcomes.

Given that the students and teachers in the selected schools in the four districts have already been exposed to the pedagogical programmes before outcome data collection, a cross-section design was employed to give a snapshot of student learning outcome levels in the different pedagogical programmes and to also understand how teachers are implementing the learner-centred teaching strategies in their practice. Being cognisant of the approach's shortcomings, that is, its inability to establish a causal effect, the research included data from schools that are not implementing any of the pedagogical programmes to allow for some basic comparative analysis.

The study adopted a two-stage cluster sampling of schools and students and schools and teachers. Ten schools from each of the four districts were selected. Five of the 10 selected schools per district were learner-centred pedagogical exposure schools, and the other five were non-exposure or "business-as-usual" schools. Approximately 20 Grade 4 students from each of the 40 selected schools were sampled with a probability proportional to the enrolment sex ratio within each class. One Grade/standard 4 teacher from each of the 20 schools sampled (approximately five schools per district) from the 40 selected schools were observed giving a lesson. Twelve out of the 20 lessons observed were at learner-centred pedagogical exposure schools, and the other eight were at non-exposure or "business-as-usual" schools.

2.2 Sample

A total of 807 students were reached for the holistic skills assessment in the 40 schools across the four districts. Of the 807 students, 402 (49.81%) are boys and the remaining 405 (50.19%) are girls.

Table 1: Sample composition of students in districts per pedagogical exposure status

District	Pedagogic Exposure	Boys	Girls	Total
Temeke	HCD-DT	52	49	202
	"Business as Usual"	50	51	
Lindi	HCD-DT	50	51	200
	"Business as Usual"	49	50	
Serengeti	PBL	52	51	203
	"Business as Usual"	49	51	
Tarime	PBL	49	53	202
	"Business as Usual"	51	49	
TOTAL		402	405	807

Throughout the report, all results have been disaggregated by children's sex, age, learning differences (i.e., attention and memory issues), district, and pedagogic exposure.

Relating to the assessment of teachers' pedagogical practice, a total of 20 teachers (nine males and 11 females) were observed. This number included five teachers in Temeke, four in Lindi, six in Serengeti, and five in Tarime.

2.3 Measurement

Pedagogical Practice Observation Tool

The pedagogical observation tool was developed using adapted constructs from the LEGO Foundation's PLAY tool[1], findings from literature review (Mechelen et al., 2019; Taylor & Boyer, 2020; Panke, 2019; and Rusmann & Ejsing-Duun, 2021), and consideration of the contextual realities in Tanzanian schools as studied by this project's lead local researcher. The tool includes six constructs with three to four items per construct as well as background information on teacher sex, professional qualification, location, class size, and the level of print materials displayed in the classroom. The constructs are *support for agency, exploration, problem-solving, personal and social connection, play-based activities, and design thinking activities*. Some of the items in these constructs also bear similarity to the BEQI (Brief Early Childhood Quality Inventory) tool developed by ECD Measure for pilot in the Schools2030 programme in Uganda (Uganda BEQI Pilot, 2022)

An internal consistency reliability test revealed the following results: support for agency construct consisting of three items (α = .69), support for exploration construct consisting of three items (α = .56), support for problem-solving construct consisting of three items (α = .72), support for personal and social connection construct consisting of four items (α = .87), play-based activities construct consisting of three items (α = .83), and design thinking activities construct consisting of three items (α = .74). Based on the Cronbach alpha values, it can be said that four of the scales/constructs meet or exceed the recommended 0.70 threshold (Streiner, 2003), thus, the items for measuring each construct did so appropriately. However, the remaining two constructs, especially the support for exploration construct, have low reliability and would benefit from further development in future research.

This is a very simple tool that teachers can use to self-assess the quality of their pedagogical practice and identify areas for improvement. Right To Play intends to test and develop this tool further in its programmes in other countries to ensure possible integration in national toolkits for teachers' reflective practice in their professional development. Table 2 outlines the components of the tool and provides a list of items for each construct.

Table 2: Constructs and items for measuring learner-centred pedagogies (play-based learning and human-centred design thinking)

Constructs	Definition	Items for Measuring Construct
Support for student agency	Adult support for a child's ability to influence how and what they learn.	• Teacher provides opportunity and space for students to present their work in class and to receive feedback from peers. • Students take initiative and ask the teacher questions.

[1] The LEGO Foundation (January 2023). 'Developing the 'Playful Learning Across the Years' (PLAY) Toolkit': Summary Report.

		• Teacher introduces activities that promote student-initiated collaborative and inquiry-based learning among peers.
Support for exploration	Adult support for a child's learning through manipulation, investigation, and acting on the physical or conceptual world.	• Teacher uses reflective questioning and plenary to end activities/lessons. • Teacher uses multiple forms of representation, including visual representation, in lesson delivery. • Teacher uses probing questions to ask students about their presentations.
Support for problem solving	Adult support for a child's efforts to achieve a learning goal for which they do not have an automatic solution.	• Teacher asks students self-explanatory and open-ended questions (i.e., what, why, and how questions). • Teacher initiates inquiry-based learning practice, which uses activities that equip pupils with generic skills through problem solving. • Teacher uses clarifying questions and cues for task breakdown to assist students as they think through tasks or questions with no automatic solution.
Support for social connection and connection to personal experience	Adult actions to strengthen, build on, or demonstrate the importance of social relationships in class between teacher and student and among students themselves for the collective good. Adult support for a child's learning that relates to their personal experience.	• Teacher includes interactive group activities in lesson delivery. • Teacher makes connections in the lesson that relate to students' daily lives or learning needs. • Teacher forms small groups to undertake tasks. • Teacher creates space that fosters student-to-student discussion and collaborative/peer learning.
Use of play-based activities	Adult support for a child's learning that uses playful games and interactive activities to make sense of what they are learning.	• Teacher encourages movement activities in lesson delivery. • Teacher incorporates traditional games, songs, and dances in lesson delivery.

		• Teacher encourages pupils to use manipulatives during the lesson.
Use of design thinking activities	Adult support for a child's learning through manipulation, investigation, and acting on the physical or conceptual world to create solutions.	• Teacher observes students' level of interest or engagement in lesson. • Teacher encourages pupils to create and visualize ideas. • Teacher encourages group brainstorming exercises among pupils.

Contextualised Social-emotional Learning (SEL) Tool

A brief summary of the instrument development process is presented below. As previously stated, it must be noted that the AKF-S2030 programme had worked with stakeholders in the Temeke and Lindi districts in 2021 to develop the contextualised SEL domains of *creativity, problem solving, and self-awareness* for Grade/standard 4 students in that context/location. This research project, however, followed a separate process to ethnographically develop culturally relevant skills that fairly represent local education stakeholders' aspirations and values in the contextually diverse (i.e., rural, urban, religious) settings of the four districts, and which can directly be assessed with the students themselves on a scale of 1-5. The full results from the co-creation and piloting testing for finalisation, which involved students, teachers, and caregivers/parents to arrive at a self-report tool that can be assessed directly with students, can be found in the SEL tool development report.

Co-creation Through Grounded Theory Ethnography

In 2022, the research team embarked on the development of a context relevant SEL competencies measurement tool. The development started with a co-creation process where local education stakeholders (i.e., students, teachers, and parents/caregivers) were engaged using a grounded theory approach (Pidgeon & Henwood, 1996) of ethnographic design. Focus group discussions and interviews were employed to collect qualitative data from students, teachers, and parents/caregivers about their lived experience and local perceptions of the social and emotional competencies that are valued in their communities. These local level consultations involved 16 focus group discussions (FGDs) with students, 16 teachers, and eight caregiver/parents. The initial process resulted in:

i. Large and varied notes about behaviours and competencies that the stakeholders valued and considered important in their cultural context for children's lifelong learning success.
ii. A refined list of stakeholders' ranked social-emotional competency themes emerging as skills domains with their descriptors and elaborations.
iii. An agreed-upon and reasonable list of three top-priority skill domains (*i.e., hard work, respect, and collaboration)* that are measurable and meaningful to education programming. Items from the FGDs were used to create context-specific measures of these skills for pilot testing the tool.

Pilot Testing Psychometric Proprieties

The drafted tool with its three skill domains/constructs and 42 items, including background information, was piloted in selected schools with 382 Grade 4 students in Temeke, Lindi, Tarime, and Serengeti districts. The research team used an RMSEA sample size calculator (MacCallum, Browne, & Sugawara, 1996; Preacher & Coffman, 2006) to estimate the required sample given the degrees of freedom for possible level one and level two factor analysis models. Data for the pilot study was

collected by trained assessors one-on-one with the child using survey forms on KoboToolbox preloaded on Android tablets. Analysis of the pilot data focused on construct validity, internal consistency reliability, and inter-rater reliability. The eigenvalues, EFA and CFA test statistics for construct validity, Cronbach's alpha test for internal consistency, and Krippendorff's alpha reliability coefficient for inter-rater reliability all showed strong and valid values for the developed tool with slight modification by the removal of items that were found to have strong theoretical association. See Annex 1 for the full psychometric report of the SEL tool.

Revision and Finalization

Based on the analysis, the tool was revised to measure three distinct SEL skills for children in the upper primary grades in Tanzania—hard work, respect, and collaboration. The number of items measuring each skill was reduced to 28 items, which the researchers believe is a strong self-report survey for measuring the contextualized SEL skills in future administrations of the survey. The final tool can be found in Annex 2.

Adapted EGRA Tool

The reading assessment used in this study was adapted from the Tanzanian Ministry of Education, Science and Technology (MoEST) national EGRA tool and adjusted to match Grade/standard 4 curriculum. An individually administered and timed non-word reading test, an oral reading passage, and untimed reading comprehension subtasks were included to orally assess students' foundational reading skills.

Data were collected by a team of trained enumerators. All instructions to children were given in Kiswahili, and they were assessed on Kiswahili reading skills. Table 3 outlines the EGRA components tested and a description for each subtask.

Table 3: EGRA components tested and subtasks description

Subtasks	**Description**
Non-word reading	Reading and pronunciation of imaginary words • Number of single words read correctly. Total possible is 50 words.
Oral reading passage	Ability to read connected words in a short passage independently • Testing fluency (words in the short passage read correctly per minute) and accuracy (percentage of words in the short passage read correctly). Total possible is 100 words.
Reading comprehension	Number of questions related to the short passage read aloud by the student answered correctly • Five questions in total

The full learner assessment tool used in the cross-sectional study's data collection was comprised of student background questions, the contextualised SEL tool, and the adapted EGRA components.

2.4 Data Collection and Analysis

The local research lead in Tanzania recruited a data collection supervisor and a team of enumerators to conduct one-on-one child assessment and lesson observations. They trained the enumerators on the developed instruments and how to use tablets for digital data collection with children in schools.

Enumerators were familiar with the local context and could speak the local languages, in addition to Kiswahili, fluently. This made interactions with children, teachers, and other stakeholders in the survey communities easier. After data collection, enumerators uploaded data from the tablet to a secure server, where the local research lead and data collection supervisor could assess and check the quality of the data received. Data from learner assessments, lessons and classroom observations, and teacher in-depth interviews were collected from selected schools in all four districts by trained enumerators.

The semi-cleaned and organised data was sent from the Tanzania local researcher to the Right To Play UK-based team, where an independent data analyst was contracted to analyse the data using SPSS 29.0. An analysis plan was developed to guide the whole analysis process. Two key types of analysis were performed:

- Descriptive analyses were conducted to identify counts and calculate frequencies or percentages. For holistic learning outcomes in EGRA, we generate the mean raw scores, fluency scores for timed subtasks, scale scores or percentage of correct answers, and scores of zero (where available). Histograms are used to plot and explore the distribution of outcome data more accurately to aid skill-by-skill discussion of the EGRA findings.
- Inferential analyses were used to identify the significance of the difference between groups and subgroups (i.e., girls versus boys) and to run correlations and regressions to identify factors that predicted performance. Significance is tested and reported at 5%. Any test with a $p > .05$ is not reported as significant.

2.5 Ethical Consideration

In social research involving human subjects, ethical considerations are crucial and can be categorised into four subthemes: the potential for harm to participants, the need for informed consent, the possibility of invasion of privacy, and the use of deception (Malhotra and Birks, 2007; Bryman and Bell, 2011).

In this study, all necessary ethical standards and approvals were obtained before data collection began. The researcher provided participants with information about the study's purpose and the need for their participation. Participation was entirely voluntary, and participants could withdraw from the survey at any time. Participants' confidentiality and anonymity were ensured throughout the study.

The study was designed ethically by obtaining ethical approval from the University of Notre Dame Institutional Review Board for the development of the contextualised SEL tool. National level approvals from the National Institute for Medical Research (NIRM) and the President's Office, Regional Administration and Local Government, at the Tanzanian Ministry of Education were obtained for all stages of the research. Informed consent for adult participants and appropriate assent from students and young participants were secured before involving them in each stage of the study.

Chapter 3: Results and Discussion

This chapter presents the findings and results from the holistic learner assessment, pedagogic practice observations, and teacher interviews in the four districts of Temeke, Lindi, Tarime, and Serengeti where Schools2030's human-centred design thinking and Right To Play's play-based learning programming are being implemented in selected schools.

Results and discussions are organised in line with the three research questions.

3.1 The State of Pedagogical Practice Among Grade 4 Teachers in Schools Across the Four Districts

3.1.1 Brief Overview

Teachers' classroom practices in the four districts were observed to understand whether there are differences in their practices, in terms of their level of application of the four common constructs of learner-centred pedagogy around play-based learning and human-centred design thinking lesson planning, and the two distinguishing constructs of use of play-based activities, and design thinking activities. Twenty lessons (five lessons in each of the four districts) took place. Twelve lessons in exposure schools and eight in "business-as-usual" schools were sampled, where trained professionals observed 45-minute literacy/language lessons led by Grade 4 teachers.

3.1.2 Teacher Characteristics

Of the 20 Grade 4 teachers observed, nine (45%) are male and 11 (55%) are female. The highest professional qualification among the observed teachers was a degree in education at the bachelor's level, which was held by 15% of the teachers (two males, one female). Fifty per cent of teachers (six males, four females) had a certificate in education, and the remaining 35% (one male, six females) held a diploma in education. District level analysis showed that the majority of the teachers in Serengeti (66.67%) and Tarime (80%) possess low qualification at the certificate level. A sizeable proportion of teachers in Temeke (80%) and Lindi (50%) had a diploma in education.

In terms of access to professional development training in learner-centred pedagogies, 100% of the teachers in pedagogical exposure schools in Tarime and Serengeti reported that they've received training in play-based learning, while 20% of teachers in pedagogical exposure schools in Temeke and Lindi had training in the human-centred design thinking approach. Interestingly, 20% of teachers in Temeke and Lindi pedagogical exposure schools indicated that they received training in play-based learning. It's possible that these teachers were transferred from a school in another district implementing play-based learning. Similarly, 12.5% of teachers in "business-as-usual" schools in Temeke and Lindi received human-centred design thinking training. This could also be due to the transfer of teachers between schools. The remaining 87.5% of "business-as-usual" teachers in all four districts indicated they have not received training in any of the two pedagogies under research.

Studies from Gore et al., 2017; Guskey, 2002; and Kennedy, 2016 illustrate the relevance of pedagogy-based professional development for enhancing teaching quality. There is also abundant evidence of the effects of teacher qualification on student attainment (Manning et al., 2017). It will therefore become important for future education programming in these areas to consider how their professional development programs could support higher subject-matter qualifications for teachers, given the current relatively low level of educational qualifications among teachers in the four districts.

Table 4: Teacher characteristics

District	Gender		Professional Qualifications		
	Male	Female	Certificate in Education	Diploma in Education	Bachelor of Education
Temeke MC	1	4	1 (20%)	4 (80%)	0 (0%)
Lindi MC	2	2	1 (25%)	2 (50%)	1(25%)
Serengeti DC	3	3	4 (66.67%)	0 (0%)	2 (33.33%)
Tarime DC	3	2	4 (80%)	1 (20%)	0 (0%)

3.1.3 Classroom Climate

In the dynamic landscape of education, the role of the classroom climate in shaping children's learning outcomes has garnered increasing attention. A positive classroom climate goes beyond the physical environment; it encompasses the emotional, social, and academic atmosphere within the four walls of the classroom.

Print Rich Environment

Displaying print materials on classroom walls reinforces academic content. The availability of information and charts on educational posters enables children to engage with and learn from the written word through their surroundings. This exposure helps reinforce early literacy skills, such as letter recognition and basic sight word acquisition.

The analysis shows that the majority of classrooms are not utilizing the full potential of print items. In fact, 55% of classrooms do not display print items. The absence of print items could potentially impact the learning experience, as these materials often serve as additional resources that can aid students in visual learning. Thirty-five per cent of classrooms have only one print item available. Just 10% of classrooms have two print items. None of the classrooms meet the expected maximum of three or four print items. Low levels of print items in classrooms are observed across all districts, in both treatment and control groups. For example, in Temeke treatment schools, the 66.67% of classrooms with print materials have one print item out of the expected four. Similarly, in Tarime treatment schools, 66.67% of the observed classrooms have one print item.

The absence of print material in classrooms can have several implications for a child's learning experience; for example, children may miss out on additional opportunities to reinforce and internalize key concepts introduced during lessons. A less visually stimulating atmosphere could potentially affect a child's motivation to engage with literacy activities. Teachers and educators can consider incorporating visually appealing displays, relevant educational posters, and student work to enhance the learning atmosphere.

Building Positive Relationships

At the heart of a positive classroom climate are the relationships forged between students and teachers. These connections extend beyond the academic realm, encompassing a genuine interest in each child's well-being and growth. Teachers who take the time to understand their students on a personal level create an environment where trust flourishes. In turn, this trust becomes the foundation for effective communication, motivation, and a shared commitment to learning.

From the data, the majority of teachers (65%) frequently acknowledge student effort in answering questions. Twenty per cent of teachers acknowledge student effort sometimes, but not regularly. Fifteen per cent of teachers do not acknowledge student effort at all. District level analysis showed that in 33.33% of HC-DT schools in Temeke, teachers practiced this behaviour frequently. In 100% of HC-DT and PBL schools in Lindi and Tarime respectively, this practice was frequently observed. In 75% of PBL schools in Serengeti, teachers exhibited this behaviour either frequently or sometimes. Interestingly, this practice was observed either frequently or sometimes in 100% of the "business-as-usual" schools across all four districts. The minimal transfer of teachers from learner-centred pedagogical exposure schools to "business-as-usual" schools in some of the districts, and the relatively privileged nature of some of the "business-as-usual" schools compared to the relatively marginalised schools within the learner-centred programmes, may have accounted for the impressive observation of this behaviour among teachers at these schools.

These results from the study suggest that most teachers understand the importance of acknowledging student effort, which is a key component in building positive relationships in the classroom. Recognising effort, regardless of whether the answer is correct or incorrect, can boost students' confidence and encourage them to participate more actively in class.

Additionally, the data shows that 85% of teachers frequently speak to pupils using a friendly tone. Only 15% of teachers spoke to their pupils using a friendly tone sometimes, but not regularly. District level analysis showed that in 100% of the learner-centred schools (HC-DT and PBL sites) across all four districts, teachers frequently spoke to pupils in a friendly tone during lessons. However, this was only frequently observed in 62.5% of "business-as-usual" schools across the four districts.

This result suggests that most teachers understand the importance of maintaining a friendly tone when speaking to pupils. A friendly tone can create a positive classroom environment, helping students to feel more comfortable and empowered to actively participate. It might be beneficial to discuss with education stakeholders in the districts about providing professional development training for the few teachers in "business-as-usual" schools who are not using a friendly tone, in order to highlight the ways that doing so can foster positive student-teacher relationships.

The largely impressive proportion of teachers observed acknowledging student effort and maintaining a friendly tone with students shows generally positive teacher practices geared towards fostering a conducive learning environment in schools across the four districts. This is favourable for the learning process because positive teacher-student dynamics play a key role in shaping and nurturing a positive classroom environment.

Emotional Safety and Engagement

A crucial aspect of the classroom climate is the emotional safety it provides. Children thrive in an environment where they feel secure, valued, and free to express themselves. A teacher's ability to create a safe emotional space directly influences a child's willingness to take risks, ask questions, and engage more deeply in the learning process. When students feel emotionally supported, they are more likely to explore new ideas, collaborate with peers, and persist through challenges.

The analysis of teachers' disciplinary behaviour reveals a positive trend; in general, few instances of corporal punishment were observed. A teacher using a cane was reported in 5% of cases. In 20% of cases, a teacher yelled or shouted at a student for misbehaving. Where student misbehaviour occurred, in 30% of cases, teachers gave students the opportunity to explain themselves. In 10% of the cases, teachers explained the impact of the student's misbehaviour to the student. In 100% of HC-DT and PBL schools, no cases of teachers using a cane on students were observed. However, yelling or shouting was reported in some HC-DT schools in Temeke and Lindi. Overall, the relatively low levels of emotional safety issues support the positive teacher-student relationship presented earlier.

Table 5: Percentage scores of classroom climate items across districts and pedagogical exposure types

Selected Classroom Climate Items		**District**	**Pedagogical Exposure Type**		
			PBL (%)	HC-DT (%)	"BAU" (%)
Print richness of the classroom (*% of classrooms/schools with one or more print materials available)*		Temeke		66.67	50.00
		Lindi		.00	50.00
		Serengeti	50.00		.00
		Tarime	100.00		.00
Teacher acknowledges student effort *(% of teachers exhibiting this behaviour frequently or sometimes)*		Temeke		33.33	100.00
		Lindi		100.00	100.00
		Serengeti	75.00		100.00
		Tarime	100.00		100.00
Emotional safety *(% of teachers exhibiting this behaviour)*	*Teacher used cane on student*	Temeke		.00	.00
		Lindi		.00	.00
		Serengeti	.00		50.00
		Tarime	.00		.00
	Teacher yelled or shouted at student	Temeke		66.67	.00
		Lindi		50.00	50.00
		Serengeti	.00		.00
		Tarime	.00		.00

3.1.4 Item Analysis of the Common Constructs

Support for Student Agency

Effective and highly agentic learning environments were characterized as those where learners ask teachers questions and offer opinions or reflections (Smith, 2015), make authentic and genuine choices about their learning (Verner and Lay, 2010; Fullan and Langworthy, 2014), and have freedom of movement within the classroom to interact with teachers, peers, materials, and present their work as appropriate (Smith, 2015).

Three items were measured under this construct to understand how teachers support and create space for learners to influence the teaching and learning process. This means learning in a way that allows students to enhance their confidence, creativity, and opportunity to have a voice.

On average, teachers provided little opportunity and space for students to present their work in front of the class to receive feedback from peers. In 50% of lessons observed in pedagogical exposure schools across the four districts, this practice was not used by teachers throughout the 45-minute lesson. This was even higher in "business-as-usual" schools, where 75% of the lessons observed did not exhibit this practice. However, of the few schools that exhibited this practice either moderately (15% of observed schools) or frequently (25% of observed schools), 50% of play-based learning pedagogical schools in Serengeti and 75% of play-based learning schools in Tarime frequently exhibited this teaching practice. Thirty-three per cent of human-centred design thinking pedagogical schools in Temeke and 50% of Lindi's "business-as-usual" schools practised this behaviour sometimes, but not regularly.

Another item of interest was to observe if the teaching practice fosters confidence and interest in learners, prompting them to ask the teacher questions on their own initiative. Sixty-five per cent of all lessons observed exhibited this practice either moderately or frequently. In pedagogical exposure schools, 75% of observed lessons implemented this practice (58% of lessons did so frequently). More specifically, in schools in Temeke and Lindi (HC-DT sites), the practice was implemented 75% and 50% of the time, respectively. In schools in Serengeti and Tarime (PBL sites), the practice was implemented 50% and 75% of the time, respectively. This behaviour was seen in 50% of lessons in "business as usual" schools across the four districts, and in 25% of those lessons, it was seen frequently.

The last item, which is about teachers introducing activities that promote student-initiated collaborative inquiry-based learning among peers, was not detected in any of the 20 lessons observed.

In summary, the prevalence of teaching practice that supports student agency in the learning process was found to be low on average in most schools, even for the two agency items (i.e., opportunity and space for students to present their work in class to receive feedback from peers and pupils ask the teacher questions on their own initiative) that were present in some observed lessons. Table 6 shows the average scores for student agency items across district and pedagogical exposure type.

Low/poor scores are shaded red, average/medium scores are shaded orange, and high/good scores are shaded green.

Table 6: Average scores for student agency items across districts and pedagogical exposure types

Item #	Student Agency Items	District	Pedagogical Exposure Type		
			PBL	HC-DT	"BAU"
1	*Opportunity and space for students to present their work in class to receive feedback from peers*	Temeke		.67	.00
		Lindi		.00	1.00
		Serengeti	2.00		.00
		Tarime	2.00		1.50
2	*Pupils ask the teacher questions on their own initiative*	Temeke		4.67	4.50
		Lindi		2.50	2.50
		Serengeti	2.50		.00
		Tarime	4.67		2.00

3	*Teacher introduces activities that promote pupil-initiated collaborative inquiry-based learning among peers*	Temeke		.00	.00
		Lindi		.00	.00
		Serengeti	.00		.00
		Tarime	.00		.00

***Note**:*

(i) Item 1 has a range of 0-3; therefore, any value below 1.5 is considered low, 1.5-2 is average, and any value above 2 is considered good/high.

(ii) Item 2 has a range of 0-5; therefore, any value below 2.5 is considered low, 2.5-3.4 is average, and any value between 3.5 and above is considered good/high.

(iii) Item 3 has a range of 0-1; therefore, any value below 0.5 is considered low, 0.5-0.69 is average, and any value between 0.7-1 is considered good/high.

Support for Exploration

Under this construct, three items were measured to gauge how teachers support exploration in the learning process in a way that can nurture a lifelong love of learning in students and equip them with essential skills for success in an ever-changing world. Using reflective learning strategies, open-ended activities, and hands-on learning approaches, support for exploration practice in the learning process is crucial for fostering curiosity, critical thinking, and a love of learning in students.

Support for exploration was observed in the majority of lessons in PBL (90%) and HC-DT (57.5%) schools more than in "business-as-usual" schools (56.3%), with some variations: in Temeke and Lindi, the practice was observed in 70% of lessons, and in Serengeti and Tarime, the practice was observed in 42.5% of lessons.

It was observed that in 100% of lessons in learner-centred pedagogical exposure schools in the four districts, teachers used reflective questioning and plenary to end activities/lessons either frequently (75% or 9 lessons) or sometimes (25% or 3 lessons). Whereas in the eight "business-as-usual" schools, this teaching practice was used frequently in a little over 62% of lessons. The practice was not observed in 25% (or 2) of the lessons.

Another item of interest under this construct was teachers' use of multiple forms of representation, including visual representation to explain and deliver lesson content. In learner-centred pedagogical exposure schools, it was observed that in 100% of the lessons, teachers exhibited this behaviour either frequently (75%) or sometimes (25%). Multiple forms of representation was used frequently in 100% of lessons observed in the PBL pedagogical schools in Serengeti and Tarime. It was, however, not used at all or only moderately in observed lessons in "business-as-usual" schools in the same districts.

The use of appropriate types of questioning is key in guiding students to find answers through exploration and research. Probing questions are essential in allowing students to approach learning in various ways, fostering creativity and problem-solving skills. Therefore, the next item assessed under the exploration constructs was teachers' use of probing questions to ask students about their presentations. In spite of its importance, this practice was not witnessed in 50% of all the lessons observed. In fact, it was not seen in 75% of lessons and 100% of lessons observed in HC-DT pedagogical exposure schools in Temeke and Lindi districts, respectively. It was also absent in 25% and 33% of observed lessons in PBL pedagogical exposure schools in Serengeti and Tarime districts, respectively.

In summary, teaching practices that inspire students' exploration, opportunity for reflective thinking, and openness to challenge conventional wisdom from their own lenses were fostered by teachers in the majority of lessons observed, especially in learner-centred pedagogic exposure schools across all districts. In PBL learner-centred pedagogic schools, the practice was high for all three support for exploration items, as evident in the high average scores in Table 7. Low/poor scores are shaded red, average/medium scores are shaded orange, and high/good scores are shaded green.

Table 7: Average scores for support for exploration items across districts and pedagogical exposure types

Item #	Support for Exploration	District	Pedagogic Exposure Type		
			PBL	HC-DT	"BAU"
1	*Teachers' use of reflective questioning and plenary to end activities/lessons*	Temeke		2.33	1.50
		Lindi		2.50	3.00
		Serengeti	3.00		1.50
		Tarime	3.00		2.50
2	*Teachers' use of multiple forms of representation, including visual representation, to explain and deliver lesson content*	Temeke		2.33	2.50
		Lindi		2.50	2.50
		Serengeti	3.00		1.00
		Tarime	3.00		1.00
3	*Teachers' use of probing questions to ask students about their presentations*	Temeke		.67	2.00
		Lindi		.00	1.50
		Serengeti	2.25		.00
		Tarime	2.00		1.50

***Note**: All Items have a range of 0-3; therefore, any value below 1.5 is considered low, 1.5-2 is average, and any value above 2 is considered good/high.*

Support for Problem Solving

Teachers' support for children's efforts to achieve a learning goal for which they do not have an automatic solution was a pedagogical construct of interest in this study. Three items were measured to gauge the level of this practice in schools across the four districts.

Table 8 presents support for problem solving items broken down by pedagogical exposure and district. Although there are variations in scores, teachers across all districts and pedagogical exposure types exhibited better scores on asking self-explanatory questions and using cues/clarifying questions to assist students in dealing with difficult tasks, with scores ranging between average and good. However, the use of inquiry-based learning practices and activities was low in all districts except for Lindi, where teachers had a perfect score. Low/poor scores are shaded red, average/medium scores are shaded orange, and high/good scores are shaded green.

Table 8: Average scores for support for problem solving items across districts and pedagogical exposure types

Item #	Support for Problem Solving	District	Pedagogic Exposure Type		
			PBL	HC-DT	"BAU"
1	*Teacher asks students self-explanatory and open-ended questions (i.e., what, why, how)*	Temeke		2.33	2.00
		Lindi		1.50	2.50
		Serengeti	2.75		2.00
		Tarime	3.00		1.50
2	*Teacher initiates inquiry-based learning practice, which uses activities that equip pupils with*	Temeke		.33	.50
		Lindi		1.00	1.00
		Serengeti	.25		.00

	generic skills through problem solving	Tarime	.67		.00
3	*Teacher uses clarifying questions, cues for task breakdown to assist students in thinking through tasks/questions for which they have no automatic solution*	Temeke		2.33	2.50
		Lindi		3.00	3.00
		Serengeti	1.50		2.50
		Tarime	3.00		1.50

Note:

(i) Items 1 and 3 have a range of 0-3; therefore, any value below 1.5 is considered low, 1.5-2 is average, and any value above 2 is considered good/high.

(ii) Item 2 has a range of 0-1; therefore, any value below 0.5 is considered low, 0.5-0.69 is average, and any value between 0.7-1 is considered good/high.

Support for Social and Personal Connection

Teachers' pedagogical actions to strengthen, build on, or show the importance of social relationships in class between the teacher and students and among students themselves for the collective good, as well as the students' learning that relates to their personal experience, made up a key construct within the learner-centred pedagogical strategies that were measured in this research. Four behavioural items were measured to gauge teachers' application of this construct in their teaching practice.

As evident in Table 9, teacher practice in making connections in the lesson that relate to students' daily lives or learning needs was seen in most of the observed lessons more frequently, with average scores ranging from medium/average to good/high. Scores in all four districts were particularly high for both learner-centred pedagogical strategies (PBL and HC-DT) and even for "business-as-usual" schools in Temeke and Lindi. However, there were mixed results in the other three teaching practices under this construct, with average scores being quite low in HC-DT pedagogical exposure schools in Temeke and Lindi. Meanwhile, PBL pedagogical exposure schools in Serengeti and Tarime had consistently higher average scores than "business-as-usual" schools in the same districts. PBL pedagogic exposure schools in Tarime stood out by having 100% perfect scores in all four items under this construct. Low/poor scores are shaded red, average/medium scores are shaded orange, and high/good scores are shaded green.

Table 9: Average scores for support for social and personal connection items across districts and pedagogical exposure types

Item #	**Support for Social and Personal Connections**	**District**	**Pedagogical Exposure Type**		
			PBL	HC-DT	"BAU"
1	*Teacher includes interactive group activities in lesson delivery*	Temeke		.67	1.00
		Lindi		.00	1.50
		Serengeti	2.00		.00
		Tarime	3.00		1.00
2	*Teacher makes connections in the lesson that relate to students' daily lives or learning needs*	Temeke		4.33	4.50
		Lindi		4.50	5.00
		Serengeti	5.00		2.50
		Tarime	5.00		2.50
3	*Teacher forms small groups to undertake tasks*	Temeke		1.00	1.50
		Lindi		.00	1.50
		Serengeti	2.25		.00
		Tarime	3.00		1.50

4	*Teacher creates space that fosters student-to-student discussion and collaborative/peer learning*	Temeke		.67	1.00
		Lindi		.00	1.00
		Serengeti	2.00		.00
		Tarime	3.00		1.50

***Note**:*

(i) Items 1, 3 and 4 have a range of 0-3; therefore, any value below 1.5 is considered low, 1.5-2 is average, and any value above 2 is considered good/high.

(ii) Item 2 has a range of 0-5; therefore, any value below 2.5 is considered low, 2.5-3.4 is average, and any value between 3.5 and above is considered good/high.

Through a grounded theory approach (Pidgeon & Henwood, 1996) of ethnographic design, this research found that the three of the most important and valued contextual social-emotional learning skills by education stakeholders in the four districts are hard work, collaboration, and respect. The items under the support for social and personal connections construct would play a useful role in positioning the teaching and learning process to contribute to fostering these SEL skills in students. Linking learning to real-world applications and the students' daily lives and experiences makes learning more meaningful and fosters social interaction that not only enhances academic outcomes, but also contributes to the holistic development of well-rounded individuals. Research suggests that connecting new information to existing knowledge and experiences enhances memory retention (Bransford et al., 1999). It enhances student interest in the subject being taught, helps students see the practical implications of their education, and prepares them for life beyond the classroom by equipping them with skills applicable to their future careers and societal roles.

3.1.5 Item Analysis of the Distinguishing Constructs

In considering the distinguishing constructs, the research restricted itself to looking at constructs within districts that are programming on a particular learner-centred pedagogical strand. That is to say, the use of the play-based activities construct was considered only for Serengeti and Tarime districts, where the play-based learning pedagogical strategy is being implemented; the human-centred design thinking activities' construct was measured in Temeke and Lindi districts only. The item analysis presentation, therefore, follows in a similar manner, where scores for items under the use of the play-based activities construct are presented for PBL schools and "business-as-usual" (BAU) schools in Serengeti and Tarime districts only; the score for items under HC-DT activities are presented for HC-DT and "BAU" schools in Temeke and Lindi districts only.

Use of Play-based Activities

The use of play-based activities in the learning process at the primary school level is significant for the holistic development of children. Learning through play has emerged as an important strategy to promote student engagement, inclusion, and holistic skills development beyond the preschool years Parker, Thomsen and Berry (2022). Evidence reviewed by Parker and Thomsen (2019) suggests that playful pedagogies can be more effective in fostering social, emotional, physical, cognitive, and creative skills than "traditional" or more "highly guided" pedagogical approaches used in the primary school classroom. The research in Serengeti and Tarime districts, where playful pedagogy programming is been implemented, therefore assessed the level of implementation and use of play-based activities in lessons across the sampled schools in the districts using three items:

- *Teacher uses physical movement activities in lesson delivery*
- *Teacher incorporates traditional games, songs, and dances in lesson delivery*
- *Teacher encourages pupils to use manipulatives in lesson*

It was seen that in 50% of observed lessons in PBL pedagogical schools in Serengeti district, teachers encouraged physical movement activities in lesson delivery, compared to 0% of lessons in "business-as-usual" schools in the same district. In PBL pedagogical schools in Tarime district, the teachers' use of physical movement activities was seen in 100% of the lessons observed, compared to 50% of lessons in "business-as-usual" schools in the same district. On average, in the two districts, physical movement activities as a teaching practice were observed in 42% of assessed lessons in pedagogical exposure schools and in 13% of "business-as-usual" schools.

The Whitebread et al. (2017) white paper on the role of play in a child's development indicated that games with rules, especially board games with numbers and linear number sequences, lead to improvements in numeracy/mathematics ability. Physical games with rules were shown to help children, especially boys, adapt to formal schooling. Also, in the Hromek and Roffey (2009) review of theoretical and practical literature, it is argued that games are a powerful way of developing social and emotional learning skills in children. Coinciding with previous statements, the second item under the play construct measured teachers' incorporation of traditional games, songs, and dances in their lesson delivery. In 100% of lessons observed in PBL pedagogical schools in Serengeti district, teachers practised this behaviour in their lesson delivery. For "business-as-usual" schools in the same district, this behaviour was seen in only 50% of the lessons observed. In Tarime district, 67% of lessons observed in PBL pedagogical schools exhibited this behaviour, while none of the lessons in "business-as-usual" schools in the same district showed any sign of this teaching practice.

The last item under this play-based activities construct, teachers encourage pupils to use manipulatives in lesson, was observed in 75% of PBL pedagogic schools in Serengeti district and in 100% of PBL pedagogic schools in Tarime district. It was not observed in "business-as-usual" schools in both districts.

Table 10: Average scores for use of play-based activities items across districts and pedagogical exposure types

Item #	Use of Play-based Activities	Districts	Pedagogic Exposure Type	
			PBL	"BAU"
1	*Teacher uses physical movement activities in lesson delivery*	Serengeti	.50	.00
		Tarime	1.00	.50
2	*Teacher incorporates traditional games, songs, and dances in lesson delivery*	Serengeti	1.00	.50
		Tarime	.67	.00
3	*Teacher encourages pupils to use manipulatives in lesson*	Serengeti	.75	.00
		Tarime	1.00	.00

***Note**: Item 2 has a range of 0-1; therefore, any value below 0.5 is considered low, 0.5-0.69 is average, and any value between 0.7-1 is considered good/high.*

Use of Human-centred Design Thinking Activities

Human-centred design thinking (HC-DT) is an innovative and learner-focused approach that can be effectively applied in primary schools. HC-DT places students at the centre of the learning process, ensuring that educational experiences are tailored to their unique needs, abilities, and interests. As part of the ideation stage, HC-DT involves collaborative brainstorming sessions, where diverse perspectives are valued, and students are encouraged to generate creative ideas and solutions for addressing a defined learning goal. Teachers gather and use students' feedback to iterate and refine the learning experience, ensuring that they effectively meet students' needs and preferences. Students

are involved in prototyping through hands-on activities, including experimentation, visualisations, and projects that allow students to put their ideated solutions or ideas into action.

Incorporating human-centred design thinking in primary schools can transform the learning environment into a dynamic, student-focused space that promotes creativity, critical thinking, and a lifelong love of learning. To measure how teachers are actualising this construct in school in Temeke and Lindi districts where HC-DT pedagogic programming is been implemented by the Aga Khan Foundation-led Schools2030 learning improvement programme, the current research used three items:

- *Teacher observes pupils' level of interest or engagement in lesson.*
- *Teacher encourages pupils to create and put their ideas into visualisation.*
- *Teacher encourages group brainstorming exercises among pupils.*

Low/poor scores are shaded red, average/medium scores are shaded orange, and high/good scores are shaded green.

Table 11: Average scores for use of human-centred design thinking activities items across districts and pedagogical exposure types

Item #	Use of human-centred design thinking activities	Districts	Pedagogic Exposure Type	
			HC-DT	"BAU"
1	*Teacher observes pupils' level of interest or engagement in lesson*	Temeke	1.00	.50
		Lindi	1.00	1.00
2	*Teacher encourages pupils to create and put their ideas into visualisation*	Temeke	.00	.00
		Lindi	.50	.50
3	*Teacher encourages group brainstorming exercises among pupils*	Temeke	.33	.50
		Lindi	.00	.50

***Note**: Item 2 has a range of 0- 1; therefore, any value below 0.5 is considered low, 0.5-0.69 is average, and any value between 0.7-1 is considered good/high.*

As shown in Table 11, the practice of empathising, gathering student feedback, and ensuring that the learning experience engages and maintains students' interest in the learning process was evident in 100% of the lessons observed in HC-DT pedagogical schools in the two districts of Temeke and Lindi. This practice was also pronounced even in "business-as-usual" schools within the two districts. However, the prevalence of the two remaining items (i.e., teacher encourages pupils to create and put their ideas into visualisation and teacher encourages group brainstorming exercises among pupils) were concerningly low in HC-DT pedagogical schools in the two districts of Temeke and Lindi, with average scores ranging between 0-0.5 on a scale of 0- 1. Supporting students to create and put their ideas/solutions into concrete visualised formats or encouraging brainstorming during the ideation stage of HC-DT are key practices with the HC-DT pedagogy. It therefore surprising that these behaviours are seldom implemented by teachers in the HC-DT pedagogical schools within the two districts. Programme implementers may need to investigate this further and take action to address any challenges. It must, however, be noted that most HC-DT designated pedagogical schools in Temeke had not yet received their human-centred design training at the time of data collection.

3.1.6 Learner-centred Pedagogic Strands' Common Constructs and their Total Average Scores

The learner-centred pedagogic strands of PBL and HC-DT have four common constructs or domains that were measured in this current action/applied research. Total average scores reveal a nuanced picture of the application of learner-centered pedagogical strategies across the four common domains in the districts.

The support for exploration and support for problem-solving domains had relatively better average scores in both PBL and HC-DT pedagogical exposure schools across all four districts. However, the average percentage of the mean scores relative to the total score (9) of the support for exploration domain was 91.67% for Serengeti PBL, 88.89% for Tarime PBL, 59.22% for Temeke HC-DT, and 55.56% for Lindi HC-DT. This finding suggests the need to improve the support for exploration teaching strategy among teachers in Temeke and Lindi. The situation for the support for problem solving domain was no different, as the average percentage of the mean scores were below 70% for Temeke HC-DT and Serengeti PBL, with Lindi HC-DT and Tarime PBL achieving 78.57% and 95.29%, respectively, in relation to the total possible score (7).

On average, PBL pedagogical exposure schools in Serengeti and Tarime performed well in the support for social and personal connection domain, achieving above 80% relative to the highest score (14) in both districts. The same cannot be said for this domain in HC-DT pedagogical schools in Temeke and Lindi. In both cases, the average percentage of the mean scores relative to the total score for this domain was below 48%.

The support for student agency domain lags behind in all schools across the four districts with the exception of Tarime PBL, which achieved an average mean score percentage of 74% relative to the total score (9). Certain sociocultural factors, such as cultural expectations of children, limited access to learning resources, and the exam-centric nature of the education system with a focus on rote memorisation and passive learning, contribute to the suppression of student agency, particularly for certain groups in most African primary schools, where teacher-centred pedagogies are prevalent and could account for observations from the surveyed schools. Meanwhile, research shows that student agency equips learners to think critically, problem-solve creatively, and develop a love of learning. The pedagogic and learning improvement programmes of Schools2030 and Right To Play across the four districts should support education stakeholders to address low levels of student agency in primary schools within these locations. Table 12 presents the total average domain scores by pedagogic exposure type and district.

Table 12: Total average domain scores by pedagogical exposure type and district

Item #	Common domains of learner-centred pedagogical strands	District	Pedagogic Exposure Type		
			PBL	HC-DT	"BAU"
1	*Support for student agency*	Temeke		5.33	4.50
		Lindi		2.50	3.50
		Serengeti	4.50		.00
		Tarime	6.67		3.50
2	*Support for exploration*	Temeke		5.33	6.00
		Lindi		5.00	7.00
		Serengeti	8.25		2.50
		Tarime	8.00		5.00

3	*Support for problem solving*	Temeke		4.00	5.00
		Lindi		5.50	6.50
		Serengeti	4.50		4.50
		Tarime	6.67		3.00
4	*Support for social and personal connection*	Temeke		6.67	8.00
		Lindi		4.50	9.00
		Serengeti	11.25		2.50
		Tarime	14.00		6.50

***Note**:*

(i) Items 1 and 2 have a range of 0-9 each; therefore, any total average value below 4.5 is considered low, values between 4.5-6.3 are average, and any values of 6.3 and above are considered good/high.

(ii) Item 3 has a range of 0-7; therefore, any total average value below 3.5 is considered low, values between 3.5-4.9 are average, and any values of 4.9 and above are considered good/high.

(iii) Item 4 has a range of 0-14; therefore, any total average value below 7 is considered low, values between 7-9.8 are average; and values of 9.8 and above are considered good/high.

Due to the low sample size of the lesson observations (n=20), a test of statistical difference of the domains across the districts and pedagogical type was not done. As such, a test will produce spurious results.

3.2 The Status of Holistic Learning Outcomes Among Grade 4 Children in Temeke, Lindi, Tarime, and Serengeti

3.2.1 Brief Overview

Most education systems around the world have embraced the idea of a "whole child" approach in teaching, that is, a focus on their holistic development. In particular, the focus of primary education in Tanzania, as espoused in their national curricula, is to prepare students to live in any challenging environment and actively participate in national and community development programs. This is accomplished by emphasising a student-centred approach and promoting a holistic learning experience (Curriculum for Primary Education STD I -VII Nov. 2020.pdf (tie.go.tz)). Within this curriculum, the education stakeholders emphasize reading, numeracy, respect for self and others, collaboration, and appreciating and valuing work as some of the core competencies and objectives of Standard III – VII primary education in Tanzania.

It is helpful to note that a holistic approach to education and the value placed on holistic skills development, from literacy to social-emotional skills, resonates with the current AKF-led Schools2030 funded research. Together, with adapted literacy skills measurement, the research co-created with education stakeholders in the four study districts produced contextually appropriate measures of social-emotional learning, which include hard work, respect, and collaboration domains. These formed the holistic learning outcomes (literacy, hard work, respect, and collaboration) on which 807 Grade/standard 4 students in 40 schools were assessed in this research study. The students assessed were between the ages of 9 to 15, and the average age was 11.2 years old (11.4 for males and 10.9 for females).

This section of the report presents and explores findings on the status of these learning skills among students by Grade/standard 4 completion.

3.2.2 Literacy Skills Among Students Across Districts and Pedagogical Type

Through its 3Rs (reading, writing, and arithmetic) programme established in 2013 and centred on the foundational skills of literacy and numeracy, the Tanzanian Ministry of Education, Science and Technology established national benchmarks in reading and mathematics (Tanzania National EGRA Report, 2016; Curriculum for Primary Education STD I -VII Nov. 2020.pdf (tie.go.tz)). The national benchmark for Kiswahili reading using EGRA subtasks sets out the following for standard II:

- Non-word reading: 40 correct words per minute
- Oral reading fluency: 50 correct words per minute
- Oral reading comprehension: 80%

Literacy skills analysis therefore focused on these three subtasks.

Overall Findings on Reading Performance

Overall, it appears that student performance in reading is below national standards for non-word reading and oral comprehension (see Table 13). Only 17.50% of Grade/standard 4 students met the national grade/standard II non-word reading fluency benchmark. The average non-word reading fluency among assessed students in the current study is 29.8 correct words per minute, and 48.45% of students scored below this. On the oral reading passage, however, students performed well, with an average fluency of 61.40 correct words per minute. 48.9% of the students achieved or scored above this average. 74.8% of assessed students achieved or surpassed the national benchmark of 50 correct words for reading fluency. Student performance, in terms of oral reading, was impressive, however, only 0.7% of assessed students met the oral reading comprehension benchmark of answering 80% of reading questions correctly.

Table 13: Proportion of Grade/standard 4 students meeting Tanzanian national benchmarks on EGRA subtasks

EGRA Subtasks	Standard II Benchmark	Proportion of Assessed Students Meeting Benchmark
Non-word reading	40 correct words per minute	17.50%
Oral reading fluency	50 correct words per minute	74.80%
Oral reading comprehension	80% correct	0.70%

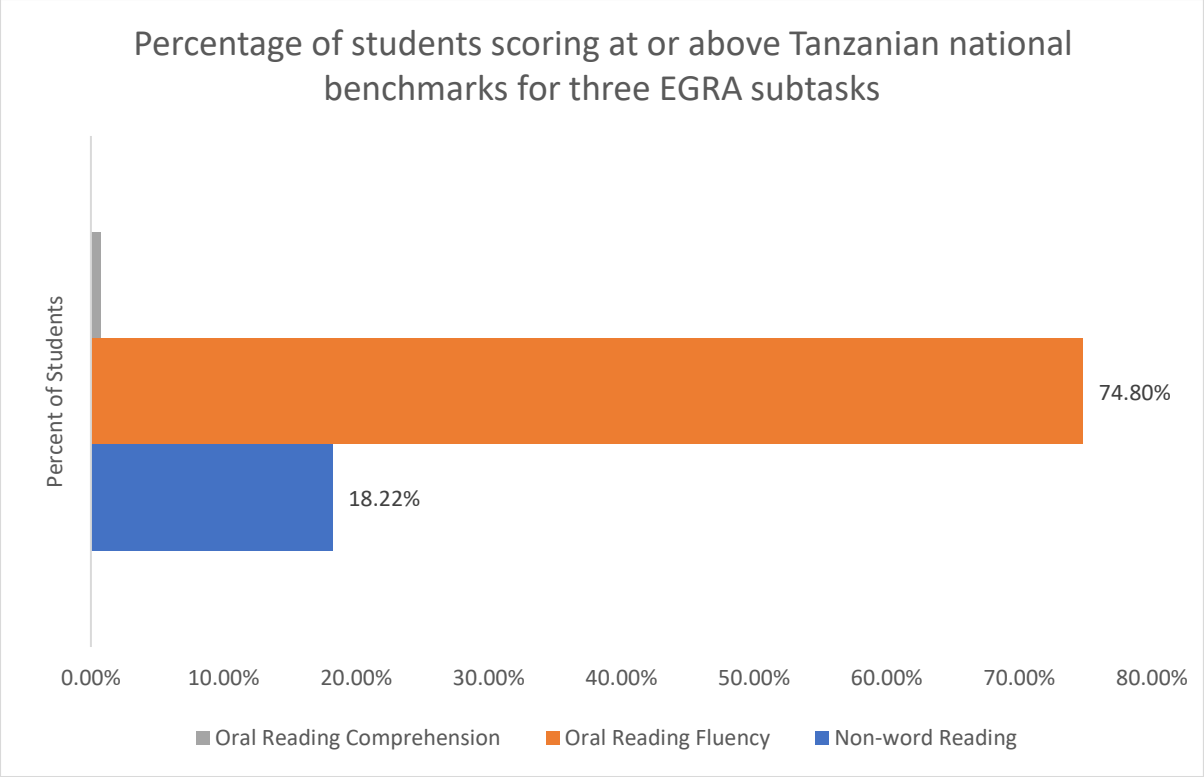


Figure 1: Percentage of students scoring at or above Tanzanian national benchmarks for three EGRA subtasks

While fluency scores and averages give useful information on the level of literacy skills among students, they do not always reveal the true dynamics of student performance, especially for continuous variables, like EGRA subtasks, which are not always normally distributed. It is therefore important to show the distribution of scores among the students. Figure 2 shows that the distribution for non-word reading total correct scores is approximately symmetric with scores slightly skewed towards the left (i.e., a skewness value of -0.061), which means that the scores for most students in this subtask were slightly low. There were no scores of zero recorded among the students in this subtask.

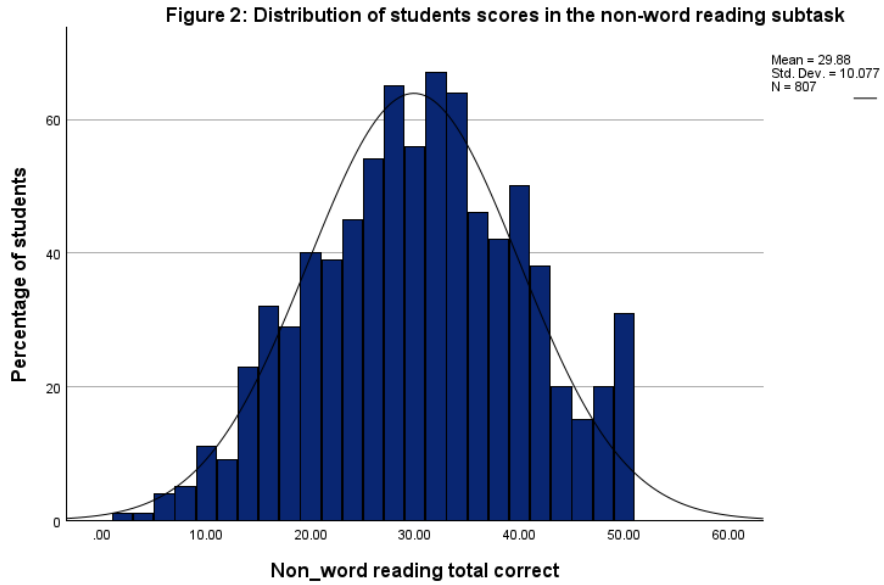


Figure 2: The distribution of students' scores in the non-word reading subtask

The distribution of oral passage reading scores is also approximately symmetric with scores slightly skewed towards the right (i.e., a skewness value of 0.041), which means that the scores for most students in this subtask were slightly high. There were no scores of zero recorded among the students in this subtask.

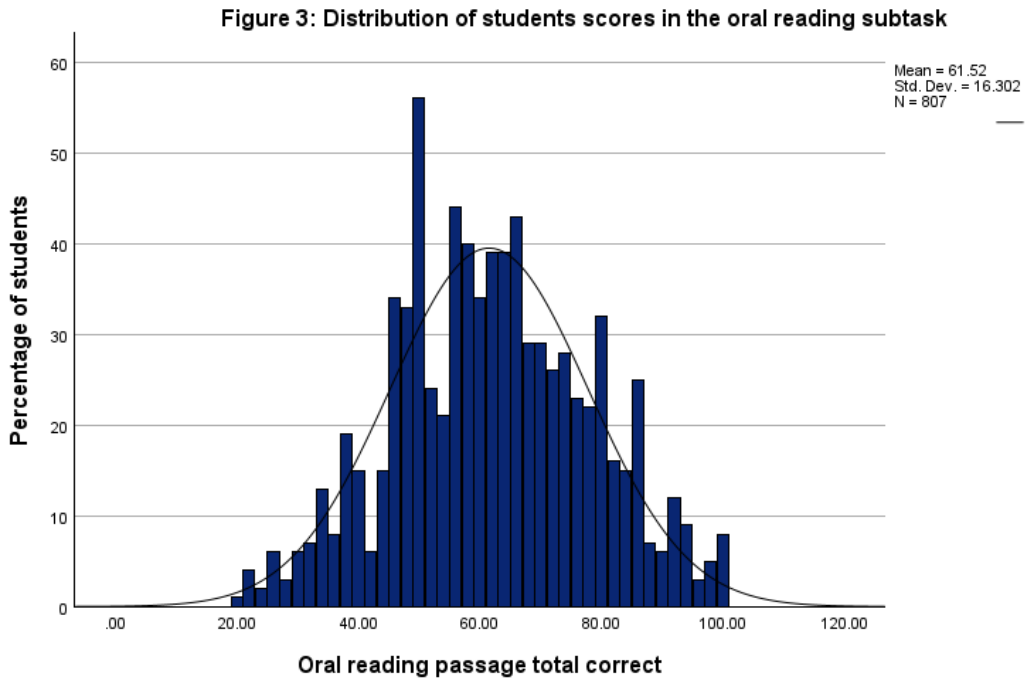


Figure 3: The distribution of students' scores in the oral reading subtask

More than half the students (62%) classified as readers were unable to answer a single reading comprehension question correctly. As shown in Figure 5, the reading comprehension scores are not normally distributed with scores highly skewed towards the right (i.e., a skewness value of 1.60), which means that the scores for most students in this subtask were mostly low.

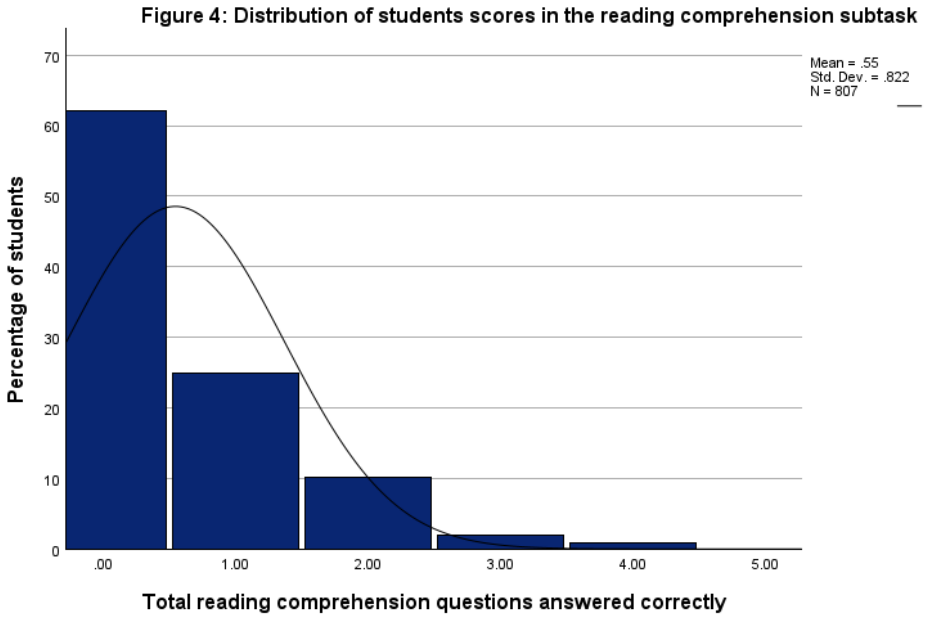


Figure 4: The distribution of students' scores in the reading comprehension subtask

Findings on the Three Reading Subtasks by Districts and Pedagogical Type

In Temeke and Lindi's human-centred design thinking (HC-DT) pedagogical schools, students identified between 30.6 and 31.8 correct non-words per minute. Within the same districts' "business-as-usual" (BAU) schools, students scored between 30.2 and 31.5 correct non-words per minute. These averages compare favourably to students' performance on the non-word reading subtask in Serengeti and Tarime districts within both play-based learning (PBL) and "business as usual" pedagogical schools. For PBL pedagogical exposure schools, students on average scored 28.5 words per minute in Serengeti, and 29.5 words per minute in Tarime. Students averaged between 25.1 and 30.5 words per minute in BAU schools within the same districts. A one-way ANOVA was conducted to determine if students' performance on the non-word reading subtask was statistically different across the four districts. There was a significant difference between groups ($F(3,803) = 8.97$, $p < .001$). A Tukey post-hoc test for multiple comparisons showed that mean scores of Temeke district (M = 31.65, SD = 9.68), Lindi (M = 30.44, SD = 8.95), and Tarime (M = 29.98, SD = 9.74) were significantly different than the score in Serengeti district (M = 26.86, SD = 10.40). However, there was no significant difference between the mean scores of Temeke, Lindi, and Tarime. Also, an independent sample t-test showed no significant difference between the mean scores of students at schools implementing the two learner-centred pedagogical strategies (HC-DT and PBL) and students at schools not implementing any of the stated pedagogies ("business-as-usual").

Table 14: Mean fluency scores by district and pedagogical exposure type

Item #	**EGRA Subtasks**	**District**	**Pedagogical Exposure Type**		
			PBL	HC-DT	"BAU"
1	Non-word reading - *Correct non-words per minute*	Temeke		31.8	31.5
		Lindi		30.6	30.2
		Serengeti	28.5		25.1
		Tarime	29.5		30.5
	Oral reading fluency - *Correct reading words per minute*	Temeke		65.5	63.3
		Lindi		63.7	61.6
		Serengeti	60.00		52.50
		Tarime	61.8		62.7

When presented with a 100-word short passage, students averaged 65.5 words per minute in Temeke and 63.7 words per minute in Lindi schools implementing the human-centred design thinking pedagogy. Within the same districts, students read 63.3 correct words and 61.6 correct words per minute in "business-as-usual" schools in Temeke and Lindi, respectively. These fluency scores compare favourably to students' performance on the oral passage reading subtask in Serengeti and Tarime districts within both play-based learning (PBL) and "business-as-usual" pedagogical schools. For PBL exposure schools, students on average scored 60 words per minute in Serengeti and 61.8 words per minute in Tarime. Students averaged between 52.5 and 62.7 correct words per minute in "BAU" schools in the same districts, respectively. A one-way ANOVA was conducted to determine if students' performance on the non-word reading subtask was statistically different across the four districts. There was a significant difference between groups ($F(3,803) = 9.72$, $p < .001$). A Tukey post-hoc test for multiple comparisons showed that mean scores of Temeke district (M = 64.43, SD = 16.97), Lindi (M = 62.65, SD = 13.76), and Tarime (M = 62.26, SD = 16.43) were significantly different than the score in Serengeti district (M = 56.29, SD = 17.22). However, there was no significant difference between the mean scores of Temeke, Lindi, and Tarime. An independent sample t-test showed a statistically significant difference between the mean scores of students at schools implementing the two learner-

centred pedagogical strategies (M = 62.73, SD = 15.40) and students at schools not implementing any of the stated pedagogies (M = 60.05, SD = 17.32), [t(805) = 2.324, $p < .05$].

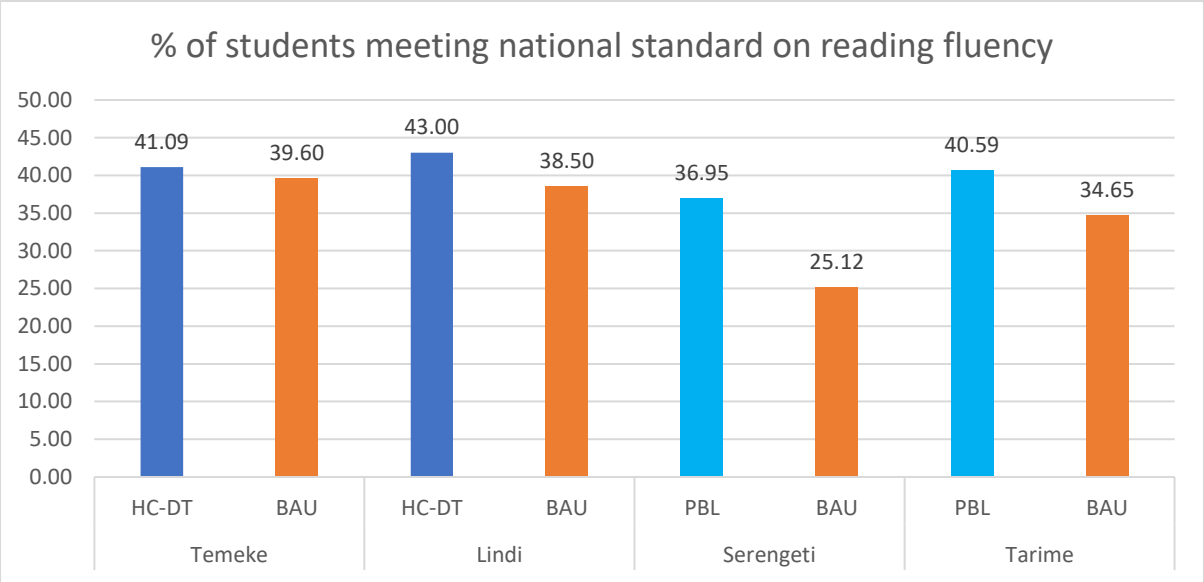


Figure 5: Percentage of students meeting the national standard on reading fluency

As shown in Figure 5 above, a further analysis of the proportion of students who met the national benchmark for oral reading fluency (i.e., 50 correct words per minute) indicates that Lindi HC-DT schools had the higher proportion of students (43%) achieving the national benchmark, compared to all other districts and pedagogical exposure types. With the exception of Serengeti PBL schools, learner-centred pedagogical exposure schools in all four districts had a higher proportion of students meeting the national reading fluency benchmark than in "business-as-usual" schools.

The relatively impressive reading fluency performance of students across all four districts and pedagogical exposure types did not translate well into reading comprehension. A reader is deemed to have met the reading comprehension benchmark if they are able to read the oral passage and answer correctly 80% (4 out of 5) of the reading comprehension questions, which were comprised of three literal questions and two inferential questions. Table 14 shows that less than 2% of assessed students in any district under any pedagogical exposure met the reading comprehension benchmark.

Table 15: Proportion of students meeting the reading comprehension benchmark by district and pedagogical exposure type

EGRA Subtasks	**District**	**Pedagogical Exposure Type**		
		PBL	HC-DT	"BAU"
Oral reading comprehension - *% of students meeting 80% correct*	Temeke		.0%	1.0%
	Lindi		.0%	1.0%
	Serengeti	1.9%		1.0%
	Tarime	1.0%		1.0%

Findings on Reading Levels

To further elucidate the results, for the purpose of this study, three categories of readers were defined with regards to their performance on the oral reading fluency (ORF) and reading comprehension subtasks: beginner readers, progressing readers, and proficient readers (Table 16).

The highest performing category, proficient readers, is defined as those who could correctly read 50 or more words from the oral passage in one minute and with 80% or higher comprehension. In other words, they are readers who meet both the benchmark for ORF and for reading comprehension. This category of reader constituted 0.62% of the students. The beginner readers (those who could correctly read between one and 29 words per minute) made up 2.2% of the students. Progressing readers (those who could correctly read 30 words or more per minute) constituted the larger part of the sample (97.18%).

Table 16: Categories of readers

Category of Readers	Characteristics	Percentage of Students
Beginner Readers	Can correctly read between one and 29 words of the story in one minute	2.2%
Progressing Readers	Can correctly read at least 30 words of the story in one minute	97.18%
Proficient Readers	Can correctly read at least 50 words of the story in one minute and with 80% or higher comprehension	0.62%

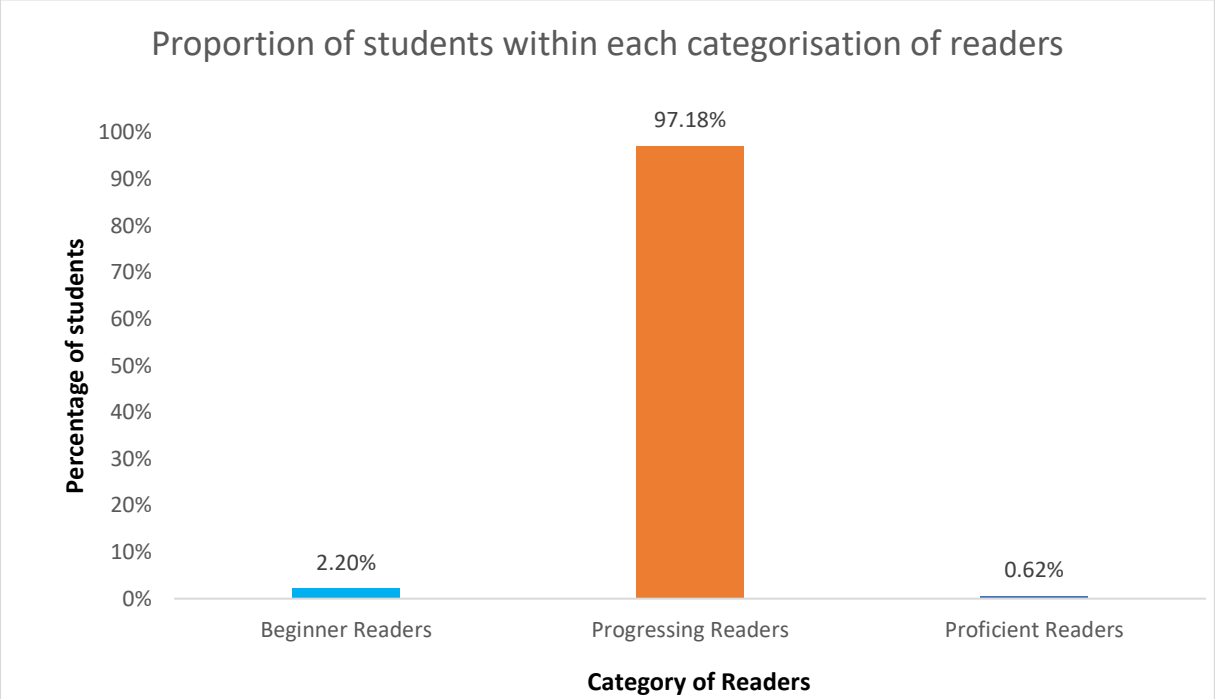


Figure 6: Proportion of students within each categorization of readers

3.2.3 Overall Findings on Contextually Defined Social-emotional Learning (SEL) Skills

As stated in the introduction, the contextually developed SEL skills with stakeholders in this research project were conceptually different from the selected SEL domains (i.e., creativity, problem-solving, self-awareness) in the Schools2030 programme and SEL domains (i.e., respect, concentration, problem-solving, self-confidence, teamwork, communication) in Right To Play's PBL programme. It should be well noted that teachers in these pedagogical schools have been focusing on fostering SEL skills that differ from the domains in this research. However, the findings from this research remain important for programme implementers to consider with regards to how the programme's content or

focus can be adjusted to respond to the contextually defined and valued SEL domains identified from this research.

Overall, the average score on the SEL assessment was relatively high (M = 41.48, SD = 4.11) compared to a possible total weighted score of 46.67 on the SEL scale. There was a positive skew to the distribution, in that a significant number of the students (about 59%) received 90% of the maximum score on the scale (see Figure 7 for distribution of SEL scores).

Table 17 shows that the mean score was similar across districts, with no statistically significant differences. However, an independent t-test shows that there were significant differences, [t (805) = 1.960, $p < .05$], between SEL scores of students engaged in learner-centred pedagogies (HC-DT or PBL), and those who are not engaged in such pedagogy ("business-as-usual" schools). Students experiencing human-centred design thinking or play-based learning pedagogical approaches in all four districts exhibited high average SEL scores compared to the average scores of other Grade/standard 4 students in "business-as-usual" schools in the same districts.

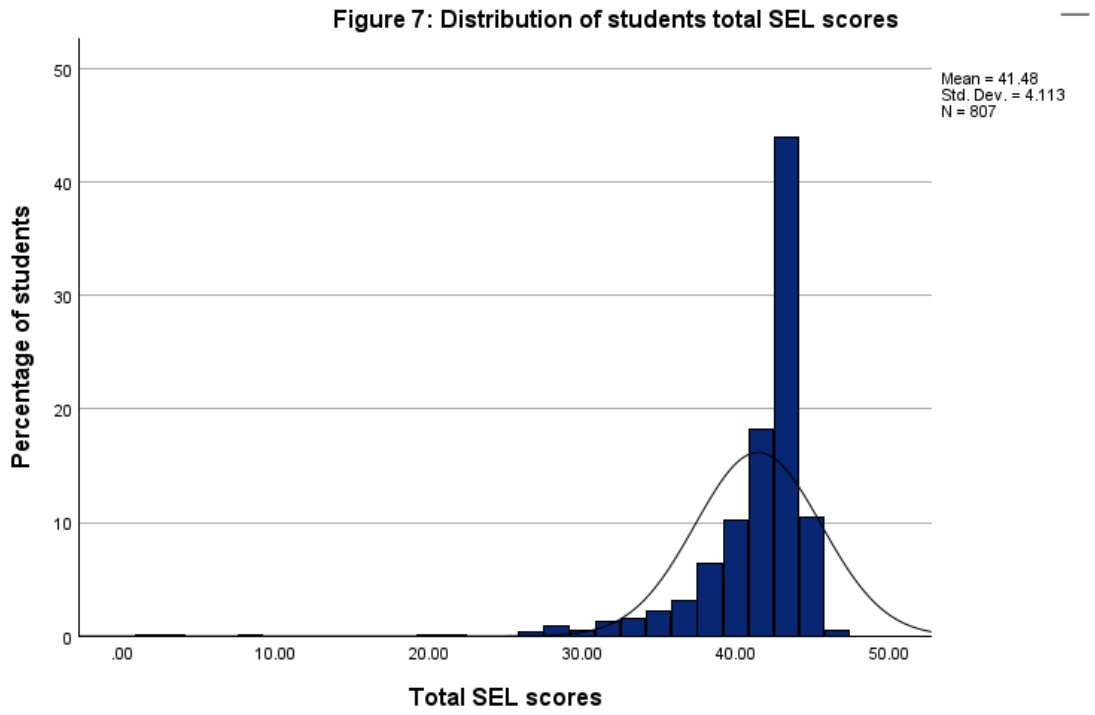


Figure 7: The distribution of students' total SEL scores

Table 17: Mean SEL scores of assessed students by district and pedagogical exposure type

Contextualised SEL Skills	District	District Mean Scores	Pedagogic Exposure Type		
			PBL	HC-DT	"BAU"
Combined SEL mean scores	Temeke	41.17		41.18	41.15
	Lindi	41.34		42.15	41.66
	Serengeti	41.51	41.89		41.12
	Tarime	41.91	41.83		40.85

Findings on the Three SEL Domains

This section presents the results on the three social and emotional learning skill domains (i.e., hard work, respect, and collaboration) identified and defined collectively with education stakeholders, including children in the four study districts.

Hard work

In the contextualised definition of this skill domain, hard work is a measure of student commitment and resolve to excel in learning by prioritising his/her education work, putting in the effort, and showing their appreciation of work.

Respect

This domain looks at how children consider whether it is important to be respected by others and to show respect to others by listening to and following instructions and influencing others positively with their behaviour and actions, therefore earning the respect of peers and adults.

Collaboration

This domain is defined as the understanding and appreciation of the value of working with other people, including peers, family, and adults, by sharing resources, time, and skills towards a goal that benefits the self, others, and/or the community.

Under each of the domains, students were presented with two scenarios and asked about how well they think the character in the scenario demonstrated the particular SEL skill. After the exercise, they are presented with a set of short behavioural questions that allow the student to indicate how important it is for them to behave in such a manner or take such an action. A total of 28 statements/items were used. Each statement was rated on a scale of 1-5. Individual domain scores were weighted by dividing the total score of each domain by the number of items under it (i.e., hard work = 8*5/8, respect = 8*5/8, and collaboration = 12*5/12).

On average, students had a weighted average score of 4.40 (i.e., an average percentage weighted score of 87.94%) on the hard work skill, with a positively skewed distribution. About 62.8% of the students achieved scores at or above the weighted average score.

Figure 8: Distribution of students weighted hard work scores

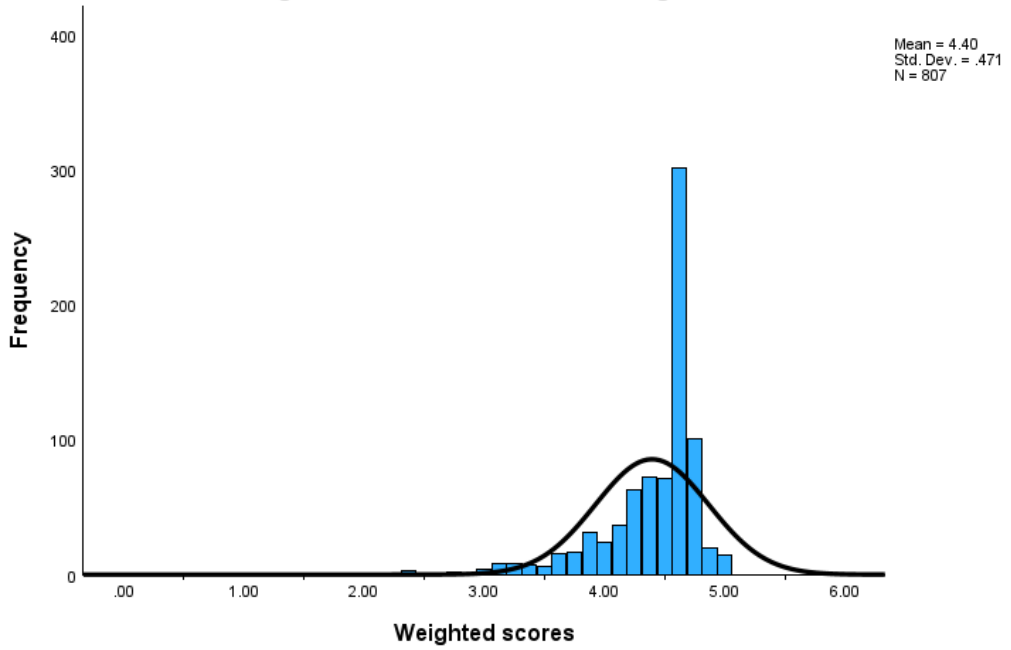


Figure 8: The distribution of students' weighted hard work scores

A one-way ANOVA test revealed a statistically significant difference between the districts ($F(3,803) = 4.12$, $p < .01$) on the hard work skill. A Tukey post-hoc test for multiple comparisons showed that mean scores of Lindi (M = 4.47, SD = .32) were significantly different than the score in Tarime district (M = 4.33, SD = .55). There was no significant difference between the mean scores of Temeke, Lindi, and Serengeti districts. However, an independent t-test shows that there was a marginally significant difference, [t (805) = 1.906, $p < .057$], between the hard work scores of students engaging in learner-centred pedagogies (HC-DT or PBL) and those not engaging in such pedagogy ("business-as-usual" schools).

Table 18: Students' weighted mean scores of hard work by district and pedagogical exposure type

Districts	District Mean Scores	Pedagogic Exposure Type		
		PBL	HC-DT	"BAU"
Temeke	4.43		4.45	4.42
Lindi	4.47		4.50	4.44
Serengeti	4.35	4.38		4.33
Tarime	4.33	4.38		4.27

Students' performance in the respect skill domain averaged a weighted score of 4.39, which is an average percentage score of 87.80%. About 63.60% of the students achieved scores above the sampled weighted score. The respect domain had a positively skewed distribution. This means that in general, the majority of students assessed demonstrated high levels of the respect skill across the four districts.

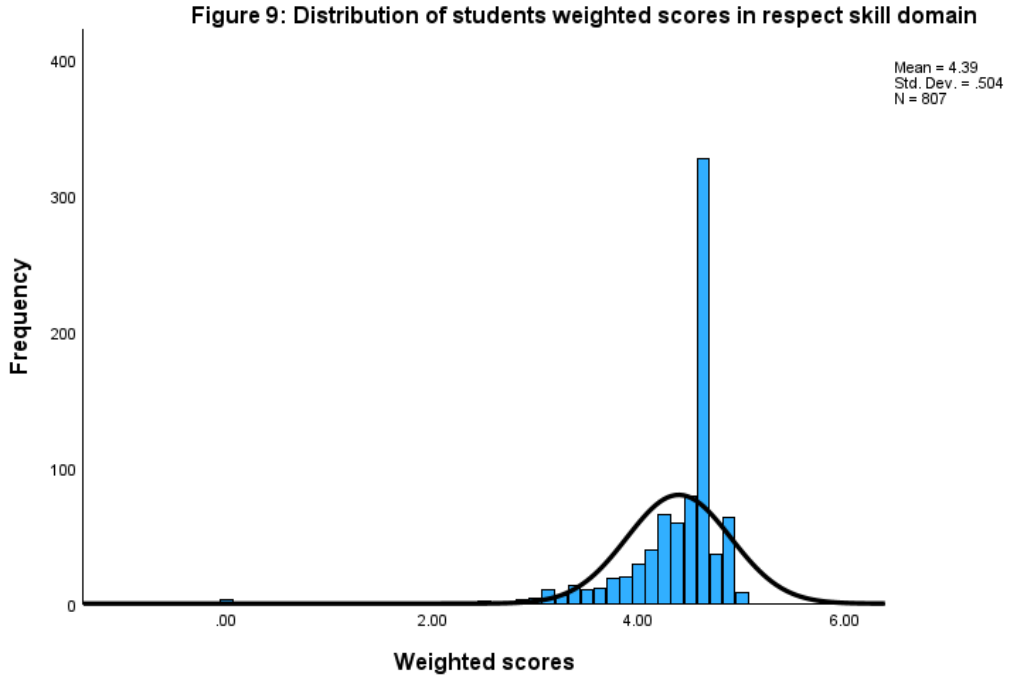


Figure 9: The distribution of students' weighted scores in the respect skill domain

A one-way ANOVA test showed a statistically significant difference between the districts ($F(3,803) = 3.35$, $p < .02$). A Tukey post-hoc test for multiple comparisons showed that mean scores of Serengeti (M = 4.45, SD = .62) differed significantly from the score in Temeke district (M = 4.30, SD = .43). There was no significant difference between the weighted mean scores of Temeke, Lindi, and Tarime districts. However, an independent t-test shows that there was a significant difference, [t (805) =

2.075, $p < .05$], between the respect skill mean scores of students experiencing learner-centred pedagogies (HC-DT or PBL) and those not experiencing such pedagogy ("business-as-usual" schools).

Table 19: Students' weighted mean scores of the respect skill by district and pedagogical exposure type

District	District Mean Scores	Pedagogical Exposure Type		
		PBL	HC-DT	"BAU"
Temeke	4.30		4.30	4.29
Lindi	4.42		4.42	4.42
Serengeti	4.45	4.50		4.40
Tarime	4.39	4.48		4.31

The last contextualised defined skill domain assessed in this research is collaboration. On this skill, students averaged a weighted mean score of 4.51, which is around an average percentage score of 90.20%. About 66.50% of the students achieved scores above the sampled weighted mean score. There was a positively skewed distribution in the collaboration skill domain. This indicates that there was generally a high level of collaboration skills demonstrated among the majority of the students assessed across the four districts. A one-way ANOVA test showed no significant difference across the districts in terms of collaboration skills among students. Further analysis also showed no significant difference in collaboration skills between students experiencing learner-centered pedagogies (HC-DT or PBL) and those not experiencing such pedagogy ("business-as-usual" schools). Social-emotional learning will likely be strongly influenced by culture, and in a recent study by Jukes et al. (2018), it emerged that stakeholders valued traits like kindness and cooperation highly. This can therefore be considered an embedded trait in the Tanzanian culture, such that caregivers and teachers evenly promote these skills among children, irrespective of the pedagogical strategy being practiced at school.

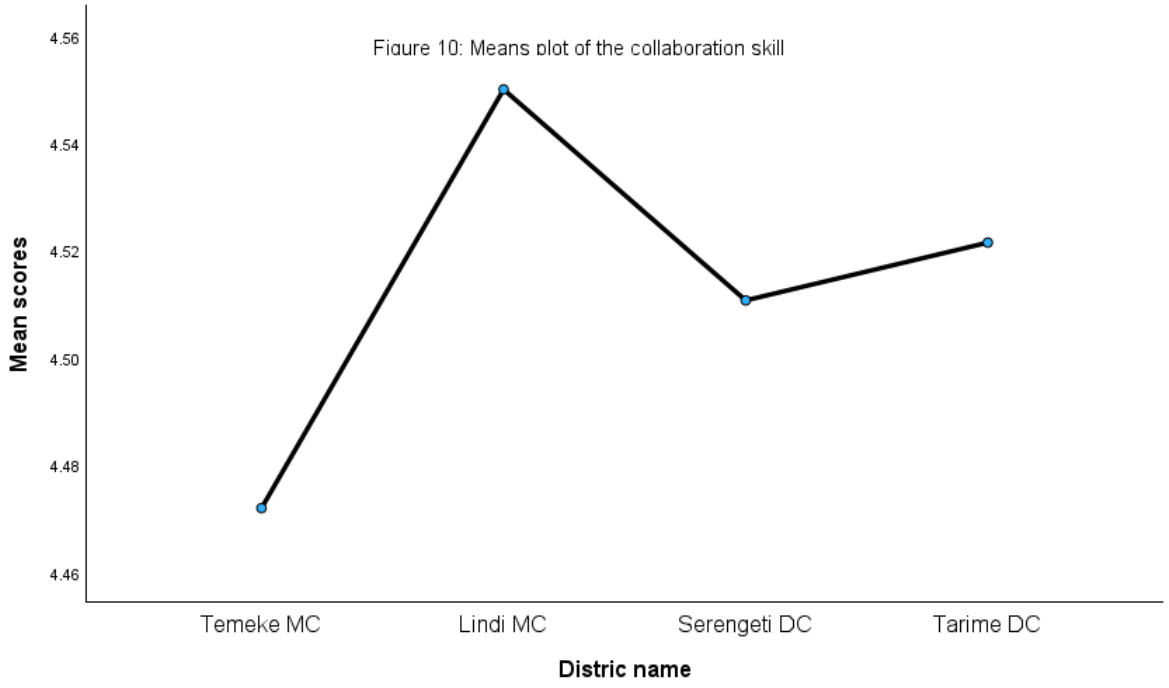


Figure 10: A plot of mean scores for the collaboration skill among students

Table 20: Students' weighted mean scores of the collaboration skill by district and pedagogical exposure type

District	District Mean Scores	Pedagogic Exposure Type		
		PBL	HC-DT	"BAU"
Temeke	4.47		4.46	4.48
Lindi	4.55		4.59	4.51
Serengeti	4.51	4.55		4.47
Tarime	4.52	4.55		4.50

To further elucidate the findings of this research regarding Grade/standard 4 students' level of the contextualised defined SEL skills across the four districts, this section illustrates the proportion of Grade/standard 4 students who demonstrated skill level at or above the weighted mean score for all domains across district and pedagogical exposure status.

Table 21: Proportion of students who demonstrated skills at or above mean scores

Districts	Pedagogical Types	Percentage of Students		
		Hard Work	Respect	Collaboration
Temeke	HC-DT	67.33	48.51	55.45
	BAU	57.43	46.53	59.41
Lindi	HC-DT	66.34	56.44	66.34
	BAU	53.54	61.62	58.59
Serengeti	PBL	64.08	76.70	72.82
	BAU	75.00	80.00	78.00
Tarime	PBL	59.80	74.51	68.63
	BAU	59.00	64.00	73.00

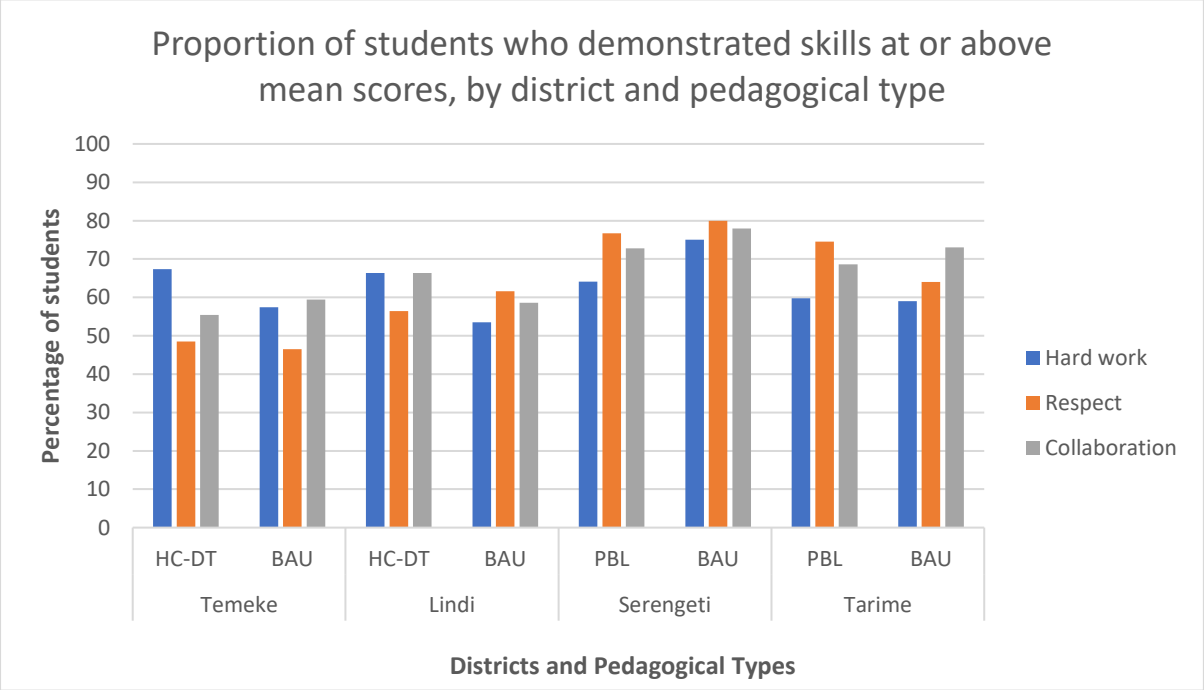


Figure 11: Proportion of students who demonstrated skills at or above mean scores, by district and pedagogical type

3.3 How Children's Holistic Learning Skills Differ Based on Sex, Age, Learning Difficulty, and Household Characteristics

3.3.1 Brief Overview

A discussion on findings regarding students' holistic learning would be incomplete without an exploration into equity factors that research has found to have an impact on children's learning skills. This section of the report examines the results of the holistic skills assessment within the context of these four equity factors: sex, age, disability, and household socio-economic status.

3.3.2 Sex-disaggregated Findings of Holistic Skills

The sex-disaggregated data of literacy skills results show that female students consistently outperform male students in non-word reading (i.e., 30.8 correct words per minute for girls, compared to 28.7 correct words per minute for boys) and reading fluency (i.e., 63.8 correct words per minute for girls compared to 59 correct words per minute for boys), with a statistically significant difference at 1%. However, in the reading comprehension subtask, male students performed better than female students (i.e., 1.24% of assessed male students met the national benchmark of answering 80% of the questions correctly, compared to 0.49% of assessed female students who met this standard).

Table 22: Proportion of Grade/standard 4 students meeting the Tanzanian national benchmarks on EGRA subtasks, disaggregated by sex

EGRA Subtasks	Male	Female
Non-word reading	14.93%	20.00%
Oral reading fluency	69.90%	79.75%
Oral reading comprehension	1.24%	0.49%

As shown in Table 22, the percentage of female students achieving the national benchmark for non-word reading and oral reading fluency was consistently higher compared to male students. While female students performed well on the fluency benchmarks, this level of performance did not always translate to the expected level of proficient/competent reading skills. Further analysis showed that the majority (98.03%) of female students fell into the progressing reader category, which means they are able to correctly read 30 words or more per minute but are unable to answer 80% or more of the reading comprehension questions. Male students, on the other hand, performed better in the proficient reader category, where 0.74% qualified as proficient readers (see Figure 12).

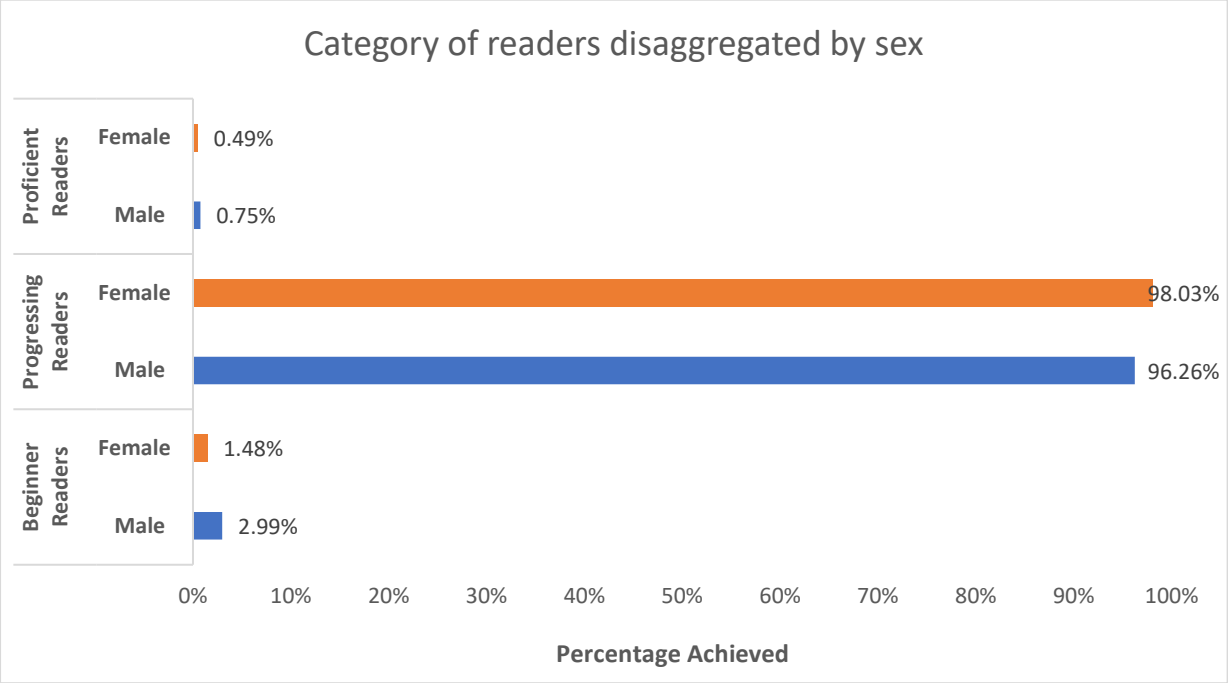


Figure 12: The category of readers disaggregated by sex

Assessing the sex-disaggregated data on social-emotional learning skills showed no significant difference between the total mean scores of female students (M = 41.50, SD = 3.82) and male students (M = 41.46, SD = 4.40), with each group having an average percentage mean score of 88% out of the maximum SEL score. Similarly, there was no significant difference between male and female students on the weighted mean scores of the individual SEL skill domains of hard work (4.40 for male students and 4.39 for female students), respect (4.39 for male students and 4.38 for female students), and collaboration (4.50 for male students and 4.52 for female students).

Upon examination of the proportion of students who achieved or surpassed the weighted mean scores under each of the three SEL skills, Table 23 shows that on average, more than 60% of both sexes achieved or surpassed the weighted mean scores. There was no significant difference in the percentage achievement between sexes.

Table 23: Proportion of students who demonstrated SEL skills at or above mean score

	Percentage of Students at or Above Mean Score		
Sex of Students	Hard work	Respect	Collaboration
Male	60.70	66.17	66.17
Female	64.94	60.99	66.91

3.3.3. Age-disaggregated Findings of Holistic Skills

In Tanzania, seven is the official primary school starting age. This means that by age 11, a child should have completed Grade/standard 4. By age 14, they should be entering lower secondary. However, the research found both younger and older children from ages nine to 15 in the same grade. Holistic skills findings are therefore presented and analysed for this particular range.

Age-disaggregated data on non-word reading skills (see Figure 13) showed that students with early age enrolment in school performed between 16.8% and 33% better than students with late age enrolment. Those with standard age enrolment (11 years old at Grade/standard 4 completion) also performed between 2.89% and 22.15% better than students with late age school enrolment (12 to 15 years old at Grade/standard 4). A one-way ANOVA test showed that the fluency score difference by age was statistically significant ($F(6,800) = 4.45$, $p < .001$). A Tukey post-hoc test for multiple comparisons showed the non-word fluency difference by age was significant at 5%, where the fluency scores of nine-year-old students (M = 35.01, SD = 8.27) differed significantly compared to the scores of 12 and 13-year-olds. A significant difference was found between the fluency scores of 10-year-old students (M = 30.90, SD = 9.30) and 13-year-olds. There was also a significant difference between the mean scores of 11-year-old students (M = 29.98, SD = 9.95) and those of 13-year-olds.

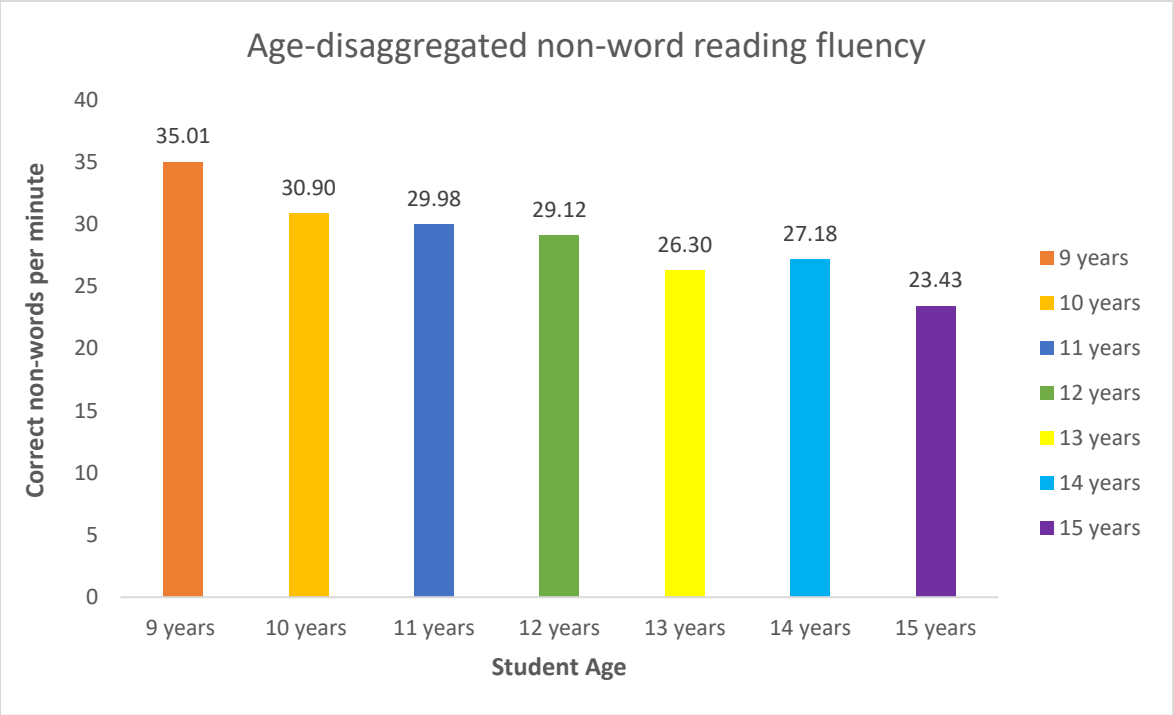


Figure 13: Age-disaggregated non-word reading fluency

The average oral reading fluency for each of the age groups met the national benchmark of 50 correct words per minute, with some variance between fluency achievement of students within different age groups (see Figure 14). A one-way ANOVA test showed that the fluency score variance by age was statistically significant ($F(6,800) = 4.03$, $p < .001$). A Tukey post-hoc test for multiple comparisons showed the non-word fluency difference by age was significant at 5%, where the fluency scores of nine-year-old students (M = 67.65, SD = 15.55) were significantly different from the scores of 13-year-olds (M = 55.66, SD = 15.48). The fluency score difference between 10-year-old students (M = 64.15, SD = 15.77) and 12 and 13-year-old students was also significant.

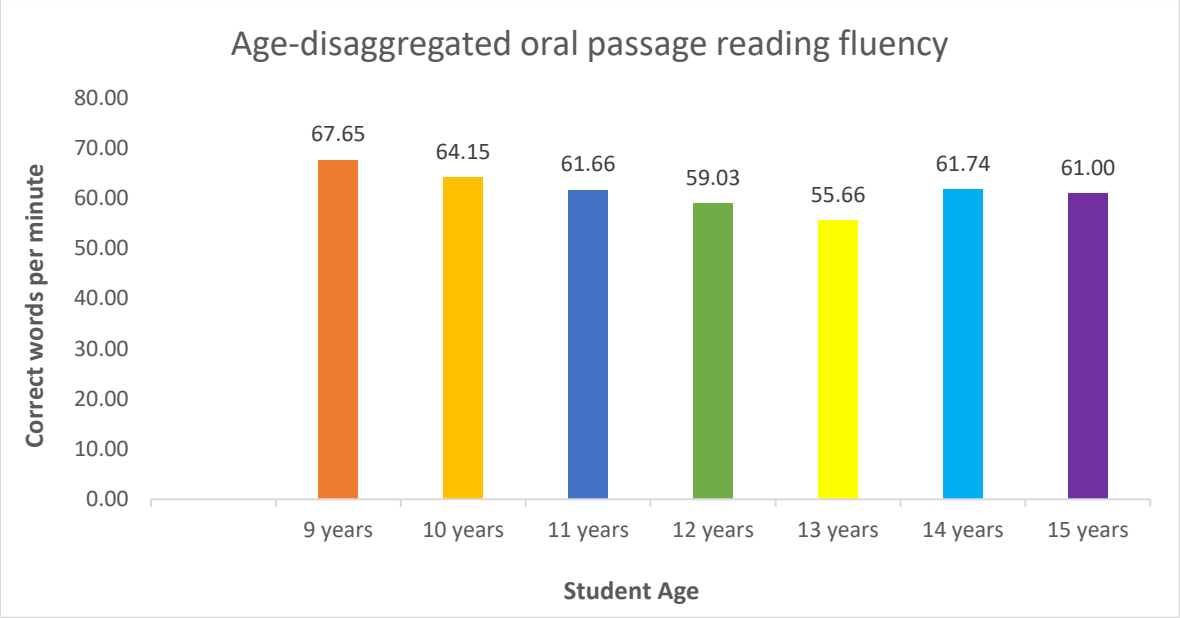


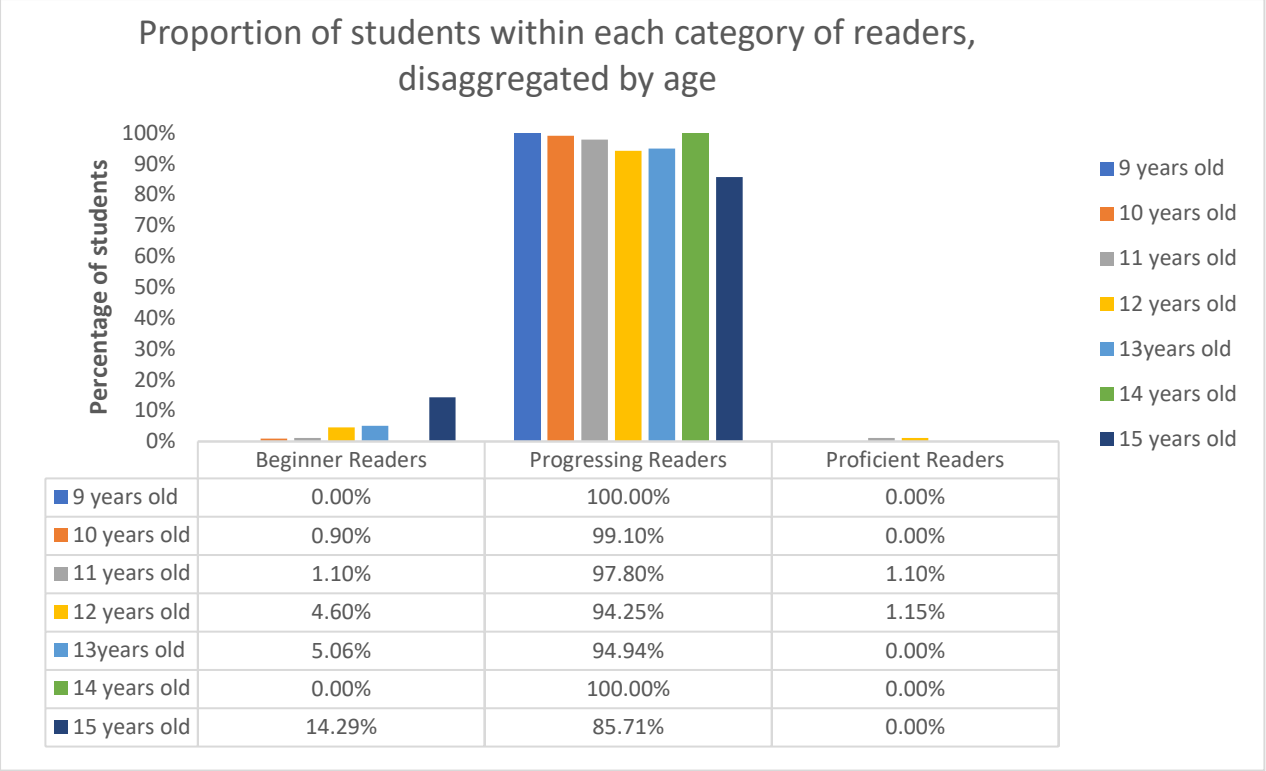
Figure 14: Age-disaggregated oral passage reading fluency

As seen in the sex-disaggregated analysis of reading skills, the age-disaggregated performance of students in the non-word reading and oral reading fluency subtasks did not necessarily translate into better results in students' comprehension skills. As shown in Table 24, the age cohorts with the majority of students meeting the national benchmark on non-word reading and oral reading fluency did not achieve a better performance on the comprehension subtask.

Table 24: Proportion of Grade/standard 4 students meeting the Tanzanian national benchmarks on EGRA subtasks, by age

Student Age	EGRA Subtasks		
	Non-word reading	Oral reading fluency	Reading comprehension
9 years old	35.71%	89.29%	0.00%
10 years old	18.39%	80.72%	0.45%
11 years old	18.68%	76.56%	1.10%
12 years old	16.67%	71.26	1.15%
13 years old	8.86%	60.76%	1.27%
14 years old	13.04%	60.87%	0.00%
15 years old	0.00%	57.14%	0.00%

Further analysis showed that all proficient readers were in the 11 and 12-year-old age group (see Figure 15). And the majority of students in the beginner reader category were 15 years old. This could be an indication that right age enrolment matters for children's later years' achievement in literacy skills; therefore, education stakeholders within the study districts would need to pay attention to that detail. However, it was encouraging to see that the majority of the students, irrespective of age, were within the progressing reader category (i.e., can correctly read at least 30 words of the story in one minute), which means that any pedagogy that aims to improve students' literacy skills should strengthen focus on teaching reading comprehension skills.



	Beginner Readers	Progressing Readers	Proficient Readers
9 years old	0.00%	100.00%	0.00%
10 years old	0.90%	99.10%	0.00%
11 years old	1.10%	97.80%	1.10%
12 years old	4.60%	94.25%	1.15%
13years old	5.06%	94.94%	0.00%
14 years old	0.00%	100.00%	0.00%
15 years old	14.29%	85.71%	0.00%

Figure 15: Proportion of students in each category of readers, disaggregated by age

Assessing the age-disaggregated data on social-emotional learning skills showed no significant difference in the total SEL mean scores of students based on age. A further analysis of the individual SEL skills domains showed no significant differences in the hard work, respect, and collaboration skills weighted means scores among the different age groups.

Table 25: Proportion of students who demonstrated SEL skills at or above the mean scores, by age

	Percentage of Students Scoring at or Above Mean Score		
Student Age	Hard work	Respect	Collaboration
9 years	78.57	46.43	75.00
10 years	64.13	65.92	69.06
11 years	60.44	61.17	67.77
12 years	62.64	66.67	62.64
13 years	65.82	65.82	64.56
14 years	60.87	56.52	60.87
15 years	28.57	71.43	42.86

Upon examination of the proportion of students who achieved or exceeded the mean score for each of the three SEL skills, Table 25 showed that a lower percentage of 15-year-olds demonstrated hard work and collaboration skills at levels equal to or above the mean scores in these skills. This majority of students at this age (71.43%) demonstrated the respect skill at or above its mean score. The majority of younger students valued and scored higher in the hard work (78.75%) and collaboration (75%) skills than any other age group in the study. While in most cases, the majority of students in the different age groups demonstrated the three respective skills above the average score, it is worth noting that on average, around 30% of students in all age groups performed below the individual SEL skills mean

scores. Further research on older students' relatively low performance in the hard work and collaboration skills and reading competencies would be appropriate in this geographical context.

3.3.4 Learning Difference Status: Disaggregated Findings of Holistic Skills

A total of 13.75% of the students sampled and engaged in this research self-reported that they had some level of difficulty related to concentrating on or remembering things. Proportionally, 11.5% of the total sample of students assessed indicated that they had some difficulty, while 2.2% mentioned that they had a lot of difficulty concentrating on or remembering things, including fun activities.

Regarding literacy skills, there was no significant difference in non-word reading scores [(No difficulty, M = 29.73, SD = 9.86), (some difficulty, M = 29.51, SD = 10.19), (a lot of difficulty, M = 30.72, SD = 7.99)], or in oral reading fluency scores [(No difficulty, M = 61.53, SD = 16.34), (some difficulty, M = 60.88, SD = 17.95), (a lot of difficulty, M = 59.00, SD = 10.93) among students with or without difficulties.

Table 26: Proportion of Grade/standard 4 students meeting Tanzanian national benchmarks on EGRA subtasks, by learning difficulty status

Learning Difficulty Status	EGRA Subtasks		
	Non-word reading	Oral reading fluency	Reading comprehension
No difficulty	17.24%	75.14%	1.01%
Yes, some difficulty	19.35%	72.04%	0.00%
Yes, a lot of difficulty	16.67%	77.78%	0.00%

Table 26 presents an overview of the percentage of students, disaggregated by difficulty status, who met the national benchmark in the three reading skills. On average, three-quarters of all students met the reading fluency benchmark, and there was no significant difference between groups. However, performance on non-word reading, which measures the ability of students to decode words, was generally low among all students, irrespective of their difficulty in concentration or memory. In all cases, less than 1 in 5 students met the national benchmark on non-word reading. It is important to note that all students who were able to meet the national benchmark on reading comprehension were those without difficulty in concentration or memory. None of the students with some level of difficulty in concentration or memory were able to meet the reading comprehension benchmark.

Further analysis (see Figure 16) showed that the smaller percentage of proficient readers (0.72%) found in the sample all fall within the group of students not experiencing difficulty in concentration or memory. All students with some or a lot of difficulty in concentration or memory were either beginner readers or progressing readers. In fact, 100% of students who had a lot of difficulty concentrating or remembering qualified as progressing readers. It is encouraging to note that, irrespective of the presence of learning difficulties, every student has the potential to progress in their journey toward becoming a proficient reader if provided with the right support. It may be said with confidence that the implementation of the two learner-centred pedagogies of play-based learning and human-centred design thinking across the four districts is creating an enabling and positive learning climate for all students to excel, irrespective of disability or learning difficulty. It is therefore important for education stakeholders in these districts to continuously provide the necessary resources for teachers and school leaders to engage and support all students in the learning process equitably.

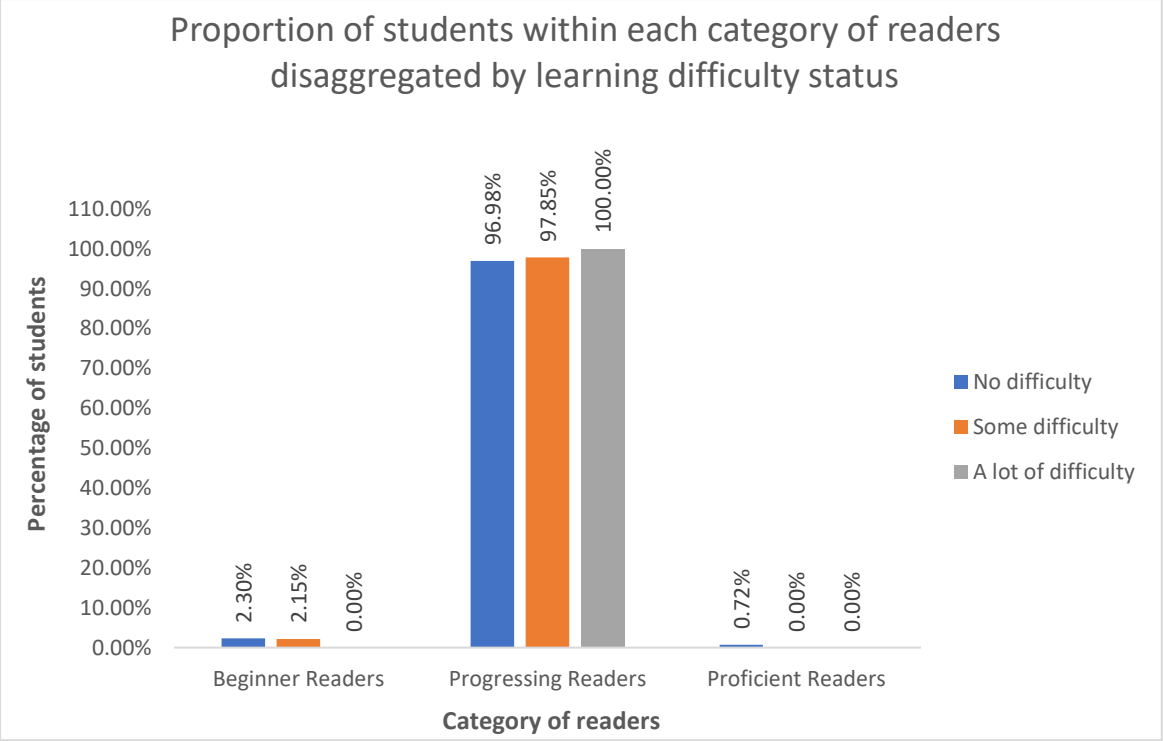


Figure 16: Proportion of students in each reader category disaggregated by learning difficulty status

Assessing the concentration and memory difficulty-disaggregated data on social-emotional learning skills showed no significant difference in the total SEL mean scores of students. A further analysis of the individual SEL skills domains showed no significant differences in the hard work, respect, and collaboration skills' weighted mean scores among the different age groups.

Upon examination of the proportion of students who achieved or surpassed the mean score for each of the three SEL skills, Table 27 shows that a lower percentage (less than 50%) of students with a higher level of difficulty concentrating or remembering were able to demonstrate hard work, respect, and collaboration skills at levels equal to or above the mean scores in these skills. In all skills, a higher proportion of students with no difficulty in comparison with those students with some level of difficulty demonstrated skill levels equal to or above the mean scores.

A Pearson chi-square test of independence was performed to examine the relationship between difficulty status and the proportion of students whose mean score is higher or equal to the mean of each skill. Significant association was found between students' difficulty status and collaboration skill, X^2 (2, N = 807) = 7.42, p = .024. There was no significant association between students' difficulty status and the other SEL skills.

Table 27: Proportion of students who demonstrated SEL skills at or above mean scores, disaggregated by learning difficulty status

	Percentage of Students Scoring at or Above Mean Score		
Learning Difficulty Status	Hard work	Respect	Collaboration
No difficulty	63.79	64.51	67.82
Yes, some difficulty	60.22	60.22	62.37
Yes, a lot of difficulty	38.89	44.44	38.89

Chapter 4: Summary of Findings and Conclusion

4.1 Summary of Findings

What is the State of Pedagogical Practice of Grade 4 Teachers in Schools Across the Four Districts?
The study, based on 20 observed lessons, revealed a diverse group of teachers, in terms of gender and qualifications, with varying degrees of exposure to training in play-based learning and human-centred design thinking.

Regarding classroom climate, the study explored the dimensions of a positive learning environment, emphasizing the importance of a print-rich setting and positive teacher-student relationships. The analysis found that a majority of classrooms lacked sufficient print materials, potentially hindering students' exposure to essential learning resources. The low level of print items in classrooms is observed across all districts in both treatment and control groups. For example, in Temeke and Lindi treatment schools, the 66.67% classrooms that had some level of print material available had only one print item out of the expected four items. Teachers and educators should consider incorporating visually appealing displays, relevant educational posters, and student work to enhance the overall learning atmosphere in the classroom.

Regarding teacher-student relationships, the study revealed that a considerable number of teachers frequently acknowledged student effort and maintained a friendly tone, contributing positively to the overall classroom climate, especially in learner-centred pedagogical schools. However, this was only frequently observed in 62.5% of “business-as-usual” schools across the four districts.

In examining the state of pedagogical practice among Grade 4 teachers in schools across the four districts, the study revealed that practices supporting students’ exploration and social and personal connection produced relatively higher average scores in learner-centred pedagogical schools compared to non-learner-centred (“business-as-usual”) pedagogical schools. However, teaching practices that support student agency and problem-solving were relatively low overall, with varying implementation levels across the districts. Meanwhile, research shows that student agency equips learners to think critically, solve problems creatively, and develop a love of learning. The pedagogical and learning improvement programmes of Schools2030 and Right To Play across the four districts should facilitate collaboration with education stakeholders to address the low levels of student agency in primary schools within these locations.

In summary, the research underscores both strengths and areas for development in the Grade 4 teachers' pedagogical practices across the districts. The findings advocate for targeted professional development, emphasizing the application of learner-centred pedagogies. Addressing the absence of print materials and promoting interactive teaching practices are crucial steps toward creating a more enriching learning environment for Grade 4 students.

The Status of Holistic Learning Outcomes—Early Grade Literacy and SEL Skills—Among Grade 4 Children in Temeke, Lindi, Tarime, and Serengeti
The research findings on holistic learning outcomes, encompassing early-grade literacy skills and social-emotional learning (SEL) skills, among Grade 4 children in the Temeke, Lindi, Tarime, and Serengeti districts reveal a nuanced picture. In terms of literacy skills, the study indicated a strong and statistically significant correlational relationship between learner-centred pedagogical approaches and

foundational literacy skills development for all students, especially those with self-reported learning differences (i.e., attention and memory difficulties). This indicates that when implemented well, learner-centred pedagogical approaches could have a potential positive impact on students' literacy skills development.

However, while students generally performed well in oral reading fluency, a significant portion struggled to meet national benchmarks in non-word reading and oral reading comprehension. Meanwhile, the distribution of scores across districts and pedagogical types consistently showed that there was a statistically significant difference between the mean scores of schools implementing the two learner-centred pedagogical strategies in all four districts [$t(805) = 2.324$, $p < .05$].

When it comes to students' contextualised SEL skills, the research shows that there are relatively high levels of context appropriate SEL skills among Grade/standard 4 students across the four districts. However, an independent t-test revealed that there were significant differences, [$t(805) = 1.960$, $p < .05$], in SEL skills scores of students receiving learner-centred pedagogies (human-centred design thinking and play-based learning) and those who are not receiving such pedagogy ("business-as-usual" schools). This difference was seen mainly in the respect and hard work SEL domains. It is helpful to note that these two SEL domains are explicitly stated in the Tanzanian National Curriculum for Grade/standard 4; therefore, implementers of the two learner-centred pedagogies could be directly contributing to Tanzania's aspiration for the nation's children.

The research findings underscore the multifaceted nature of student development, emphasizing that a holistic approach that considers both academic and social-emotional dimensions is crucial. The nuanced differences in literacy and SEL skills across districts and pedagogical types highlight the need for tailored interventions and educational strategies. The findings suggest that while there are areas of strength, such as oral reading fluency and respect skills, there are also clear challenges, especially in non-word reading and reading comprehension. This nuanced understanding provides valuable insights for education stakeholders, informing the design of targeted interventions and curriculum enhancements to ensure a more comprehensive and effective learning experience for Grade 4 students in the studied districts.

How do Children's Holistic Learning Skills Differ Based on Sex, Age, and Learning Differences?

The research delved into the nuanced aspects of children's holistic learning skills, dissecting variations based on sex, age, and learning differences status. In terms of gender differences, the study reveals the consistent advantage held by female students in non-word reading and reading fluency, yet male students outperform females in reading comprehension, interestingly. Notably, a substantial proportion of female students falls into the progressing reader category despite excelling in fluency benchmarks, emphasising a need for targeted interventions in reading comprehension skills.

Findings from the age-disaggregated analysis underscore the importance of early-age school enrolment, demonstrated by the superior performance of right-age enrolled students in non-word reading. The research distinctly reveals that while there was generally no significant difference in literacy skills based on students' learning difference status, none of the few students who self-reported some level of learning difference met the national benchmark of proficient readers.

In the area of social-emotional learning (SEL) skills, the research revealed that there are no significant variations among students' SEL skills based on age, sex, or learning difference status. In essence, the

findings underscore the multifaceted nature of holistic learning, emphasising the importance of tailored interventions to ensure equitable educational outcomes across diverse parameters.

4.2 Conclusion

In conclusion, this cross-sectional observational study provides valuable insights into the state of holistic learning outcomes and teaching pedagogy among primary 4 school children and teachers across four districts in Tanzania. The research, conducted as part of the RTP-led consortium Schools2030 project, focused on assessing the correlational effect of human-centred design thinking and play-based learning programs on student learning outcomes.

The findings regarding the state of pedagogical practice among Grade 4 teachers reveal a diverse landscape. While there are strengths observed in positive teacher-student relationships and a prevalent use of play-based activities, there are also areas that require attention. Insufficient print materials in classrooms and variations in the application of learner-centred pedagogies suggest a need for targeted professional development to create a more enriching learning environment.

Examining holistic learning outcomes, the study reveals a nuanced picture of literacy and social-emotional learning skills among Grade 4 children in the studied districts. What is noteworthy is the gender-based variation in literacy skills, with female students excelling in non-word reading and reading fluency, while male students demonstrate better performance in reading comprehension. The age-disaggregated analysis underlines the importance of right-age school enrolment for better literacy outcomes.

While SEL scores overall are relatively high across districts, there are variations in specific skill domains. Students from learner-centred pedagogical schools performed better consistently, indicating the importance of sustaining and enhancing such pedagogical programmes in the education system across these districts in Tanzania.

This applied action research provides actionable insights for education stakeholders. Strengthening teacher professional development, addressing resource disparities across classrooms, and tailoring interventions to cater to specific literacy and SEL challenges are essential steps in enhancing the overall learning experience for Grade 4 students. As education continues to evolve, these findings contribute to the ongoing discourse on effective pedagogical strategies and their impact on student outcomes.

References

Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.). (1999). How People Learn: Brain, Mind, Experience, and School. National Academies Press.

Fullan, M., and Langworthy, M. (2014). *A Rich Seam: How New Pedagogies Find Deep Learning.* London: Pearson.

Hromek, R., & Roffey, S. (2009). Promoting Social and Emotional Learning With Games: "It's Fun and We Learn Things". *Simulation & Gaming*, *40*(5), 626-644. https://doi.org/10.1177/1046878109333793

Jennifer Gore, Adam Lloyd, Maxwell Smith, Julie Bowe, Hywel Ellis, David Lubans, 2017. Effects of professional development on the quality of teaching: Results from a randomised controlled trial of Quality Teaching Rounds, *Teaching and Teacher Education*, *Volume 68, Pages 99-113*, https://doi.org/10.1016/j.tate.2017.08.007.

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modelling. *Psychological Methods*, *1*, 130-149.

Malhotra N., Birks D. (2007) Marketing Research: an applied approach, 3rd ed. European Edition, Pearson Education. Google Scholar

Parker, R., and Thomsen, B. S. (2019). *Learning through play at school: A study of playful integrated pedagogies that foster children's holistic skills development in the primary school classroom.* Billund: LEGO Foundation.

Parker R., Thomsen B. S., and Berry A. (2022) Learning Through Play at School – A Framework for Policy and Practice. *Front. Educ.* 7:751801. doi: 10.3389/feduc.2022.751801

Preacher, K. J., and Coffman, D. L. (2006). Computing Power and Minimum Sample Size for RMSEA. http://quantpsy.org

Smith, S. (2015). *Playing to engage: Fostering engagement for children and teachers in low socioeconomic regions through science and mathematics play-based learning.* Ph.D. thesis. Fremantle: University of Notre Dame Australia. Google Scholar

Streiner, D. L. (2003). Starting at the beginning: An introduction to coefficient alpha and internal consistency. Journal of Personality Assessment, 80(1), 99–103. https://doi.org/10.1002/mawe.19840150505.

Taylor, M. E., and Boyer, W. (2020). Play-Based Learning: Evidence-Based Research to Improve Children's Learning Experiences in the Kindergarten Classroom. *Early Childhood Education Journal,* 48:127–133

The LEGO Foundation. (January 2023). 'Developing the 'Playful Learning Across the Years' (PLAY) Toolkit': Summary Report.

Verner, J., and Lay, W. H. (2010). “Invoking the L in the scholarship of teaching and learning,” in *Engaging Student Voices in the Study of Teaching and Learning*, eds C. Werder and M. M. Otis (Sterling: Stylus). Google Scholar

Whitebread, D., Neale, D., Jensen, H., Liu, C., Lynneth, S. S., Hopkins, E., Kathy, H. P., and Zosh, J. (2017). *The role of play in children’s development: a review of the evidence*. White Paper. Billund: The LEGO Foundation.

Annexes

- Annex 1: The Full Psychometric Report of the Contextualised SEL Tool
- Annex 2: The Contextualised SEL Tool