An Assessment of Pedagogical Content Knowledge of Grade 1 Teachers in Lusaka, Zambia

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Abstract- ***The purpose of this study was to evaluate Grade 1 reading teachers' knowledge of language constructs for literacy instruction in public primary schools in Lusaka District, Zambia. A sample of 90 Grade 1 teachers of reading drawn from 26 public primary schools was administered with a basic language construct tool to elicit their knowledge of language constructs. The findings revealed that the participants' knowledge of basic language constructs was generally lacking in areas key to reading instruction at first grade. Furthermore, the study revealed that there is no statistically significant relationship between teachers' self-efficacy and their actual performance on tests of language constructs. Based on the findings, it was recommended that teacher education programmes should focus on ensuring that trainee teachers acquire the appropriate skills to improve their classroom teaching by refining the quality of both the curriculum and how it is delivered at college and university levels. Otherwise, poorly equipped teacher trainers cannot be expected to produce good enough literacy classroom teachers, hence the low reading acuity of children in the country.***

Indexed Terms- ***Basic Language Constructs, Reading, Zambia, Teacher Education.***

I. INTRODUCTION

The ability to read is cardinal for both academic and social achievement (Adam, 1990; Kaani, 2014). It provides opportunities for one to lead a successful and fruitful life. In this technological age, reading and writing have become ubiquitous and synonymous with knowledge acquisition. Unfortunately, reading is not a skill that comes naturally to people, rather, it must be learned through deliberate and systematic teaching and learning processes (Gough & Hillinger, 1980; Kaani, 2018; Liberman, Shankweiler & Liberman, 1989; Moats & Tolman, 2009). Thus, teachers should keenly be engaged and address the processes involved in producing competent and well-rounded readers (Joshi & Wijekumar, 2019). However, research has shown that the majority of teachers lack the necessary requisite instructional skills and content knowledge to effectively teach children (beginning readers) how to read with comprehension (Chapman, Greaney, Arrow,& Turnmer, 2017; Cheesman, Mcguire, Shankweiler, &Coyne, 2009; Cunningham, Stanovich & Stanovich, 2004; Cunningham, Zibulsky & Callahan, 2009; James, 2011; Joshi et al., 2009; Kaani, 2018; Lin & Jiar, 2018; Majdi et al., 2009; Moats, 1994; Moats & Foorman 2003; Mokotedi, 2012; Washburn et al., 2016). This phenomenon tends to have the potential to significantly contribute to poor reading proficiency among beginning readers. Shulman (1986) and Oliveira, Lopes and Spear-Swerling (2019) have argued that a good blend of pedagogy and subject content knowledge provides a critical foundation to address the needs of beginning and struggling readers. Additionally, it also enables reading teachers to demonstrate expertise in implementing multifaceted approaches to reading instruction such as explicit, sequential and systematic instruction (Moats, 1999; 1994; Snow, Griffin & Burns, 2005). Moats (1994) argued that "knowledge of language structure is as fundamental to a reading teacher as anatomy is to a physician" (p. 99).

Equally, research has also continued to show that the reading achievement of Zambian children is generally low, especially when compared to their counterparts in the region (Nkamba & Kanyika, 1998). As a result, government has been working diligently to ensure that children are able read with comprehension. Much of this work has been focused on selecting the right language policy (Joshi, McBride, Kaani, & Elbeheri, 2023; Sampa, 2005) and flooding classrooms with reading materials (USAID *Read To Succeed Project*, 2015; USAID *Mukhalidwe Athu* Project, 2016).The lower-than-expected reading levels among Zambian

children raises serious questions with regard to the kind of pedagogical content knowledge that teachers of reading possess(Kaani, 2018; Kaani, Mulenga, & Mulubale, 2016; Lufunda, 2012; Matafwali, 2010; Matafwali and Bus, 2013; McAdam, 1973; Mwanza-Kabaghe et al., 2015; Mwanza, 2011, 2020; Sharma, 1973; Tambulukani & Bus, 2011; Tambulukani et al., 1999; Williams, 1999).

Unfortunately, the caliber of teachers responsible for imparting basic reading skills to children has largely been neglected. In order to explain learners' poor reading abilities, Binks-Cantrell and colleagues (2012) employed the *Peter Effect theory*, which was based on the work of Applegate and Applegate (2004). According to the Peter Effect, one should not be expected to give what she/he does not possess. Thus, it is unrealistic to expect reading teachers who lack the appropriate pedagogical content knowledge to teach reading, such as the fundamentals of language, to be able to successfully support their struggling learners.

1.2 The Present Study

The current study's objective was to evaluate first grade reading teachers' proficiency with the basic linguistic constructs that make up the reading process in order to evaluate how well–prepared they were to teach their learners to read with the proper comprehension. Specifically, the study focused on assessing grade 1 teachers' knowledge of basic language constructs, such as phonemic awareness, phonological awareness, phonics, and morphological awareness that are important for the development of reading among beginning readers (Binks-Cantrell et al., 2012; Pittman et al., 2020). Additionally, it explored the relationship between participants' self-efficacy and how well they performed on basic language literacy constructs.

The research questions that this study envisioned to answer were (1) How knowledgeable are grade 1 teachers who are responsible for initial teaching of reading in regards to basic language constructs of literacy? (2) What specific knowledge gaps do reading teachers exhibit with regard to their understanding of basic language constructs of literacy? (3) What connection exists between reading teachers' self-efficacy and their understanding of basic language constructs? Kaani (2018) evaluated primary school teachers' knowledge of language concepts essential to the teaching of reading and discovered that while teachers rated themselves highly on self-efficacy, their practical knowledge of these concepts was significantly poor. Consequently, the goal of this study was to focus on teachers who had direct responsibility for teaching reading at grade 1 level. This is the formative stage in reading development when understanding of relevant pedagogical content is a cardinal component of teaching-learning process (Malatesha Joshi et al., 2009; Pittman et al., 2020; Washburn et al., 2016).

An understanding of reading teachers' pedagogical content knowledge may help stakeholders appreciate why reading achievement is generally below expected standards (Matafwali, 2005; Nkamba & Kanyika, 1998; Sharma, 1973; Serpell, 1978; Tambulukani et al., 1999) and poor teaching could be the main driver of these problems vexing the teaching of literacy (Joshi et al., 2023; Kaani, 2018; Moats, 1994). Additionally, appreciation of teachers' self-efficacy would help in developing more efficacious professional development to improve the teaching outcomes of building readers across Zambia. Furthermore, it is anticipated that our findings will contribute significantly to the development of teacher education programs in colleges of education and the creation of teaching-learning materials (Sampa et al., 2018; Tambulukani & Bus, 2012).

II. METHODS

2.1 Participants

Ninety grade 1 teachers drawn from 26 primary schools in Lusaka District in Zambia constituted the sample of the study. Although participating grade 1 teachers were generalists in nature—who teach all school subjects—one of their prime responsibilities was to initiate beginning readers into the processes of reading in order to effectively learn in the content areas. All teachers involved were willing participants who signed up after giving their informed consent.

2.2 Data Collection Measures

Survey of Basic Language Constructs: The Survey of Basic Language Constructs of Literacy was used to elicit grade 1 teachers' responses (Binks-Cantrell et al., 2012; Pittman et al., 2020; Washburn et al., 2016).

The instrument measures self-efficacy, and knowledge and ability of language constructs of literacy. It has two types of test items; multiple choice questions for the knowledge component and Likert-type for the self-efficacy component. On the 4-likert scale response of the self-efficacy component, participants were required to rate the extent of teachers' knowledge on the various aspects of basic language constructs of literacy on a scale ranging from 1 (minimal knowledge) to 4 (expert). The knowledge consisted of test items falling into four sub-groups namely; phonics, phonemic awareness, phonological awareness and morphological.

2.3 Procedure and Analysis Technique

The Survey of Basic Language Constructs of Literacy is self-administered. The participants were given ≤ 45 minutes to answer all questions without referring to any external material on the subject matter such as literacy modules. After completing the survey questionnaires, the first author collected the filled-in questionnaires and moved to another school where the same procedures were repeated. The reliability estimates of the survey items as determined by the Cronbach's alpha *(α)* values was 0.84, the above minimum acceptable threshold of 0.70 (Nunnally & Bernstein, 1994).

III. RESULTS

3.1 Grade1 Teachers' Knowledge of Basic Language Constructs of Literacy

The first objective of the study was to determine participants' average performance on various linguistic constructs of literacy. Table 1 below shows that in terms of phonics knowledge, the mean of the 9 test items was 3.53(*SD* = 1.88), 5.22 (*SD* = 3.38) of the 17 phonemic awareness items, and the mean score of 3.42 (*SD* = 2.13) was on the 7-item phonological awareness subtest. Furthermore, the mean performance on the 7-item morphological awareness subtest was 2.89 (*SD* = 1.89).

Overall, grade 1 teachers had very poor understanding of linguistic constructs to adequately support a more efficient development of reading skills considering that teachers' understanding of essential elements of reading was below the 50-percentage point. Phonemic awareness, where the participants scored an average of 30.71% corrects concepts, pose the most significant problems for reading teachers. However, they seem to understand phonological awareness better (48.86%). This contrast in knowledge levels between phonemic and phonological awareness suggests that there is no systematic, logical and sequential transmission during instructions among teachers from phonological to orthographic aspects of the reading.

Table 1: Means, Standard Deviations and Item Difficulty Index for each Sub-test of Teacher Knowledge.

Sub-test	*M*	*SD*	*%*
Phonics	3.53(9)	1.88	39.22
Phonemic	5.22(17)	3.38	
Awareness			30.71
Phonological	3.42(7)	2.13	
Awareness			48.86
Morphological	2.89(7)	1.89	
Awareness			41.29

3.1.1 Teachers' Understanding of the main Concepts in Phonics

Table 2 below shows teachers' knowledge levels in specific aspects of phonics. Overall, the levels of phonics among grade 1 is significantly poor; the highest mean score depicting the proportion of teachers who answered the test items were all below 60%. They seem considerable problems in differentiating between the various types of syllables in the English languages, only 10% were able to identify open syllables (e.g., *so*, *he*, *pro*/gram). However, interestingly, and counter-intuitively, 56% were able to give correct examples of the more challenging task of identifying final stable syllables (syllable ending in -*le* as in bub*ble*, cir*cle*, cra*dle*). Teachers were also relatively well-vested in rules governing soft and hard such as */s/* in *city* and */k/* in *crack*, and showed relatively good prowess in combination of consonants.

Table 2: Teachers' Knowledge on Concepts related to Phonics

Description of Items	*%*
6. If *tife* is a word *i* would sound like *i* in:	32.00
7. Combination of two or three consonants is called …	53.00

8. A soft 'c' is in the word.	48.00
9. The following nonsense words have a silent letter, except	24.00
10. What rule governs the use of /*c*/ in the initial position of /*k*/?	47.00
11. What rule governs the use of /*k*/ in the initial position of /*k*/?	41.00
12. Which of the following words has an example of a final stable syllable?	56.00
13. Which of the following words has 2 closed syllables?	42.00
14. Which of the following words has an open syllable?	10.00

Overall, these results show that reading teachers are not adequately prepared to correctly apply their knowledge of phonics to teach their learners more effectively. This is an indictment of the quality of readers schools are able to produce, which in turn negatively affects children's achievement in the content areas. The fact that participants understand more challenging aspects of phonics and fail to answer questions focused seemingly easier, issues may be symptomatic of guessing in their responses.

3.1.2. Teacher' Knowledge of Phonemic Awareness

Table 3 shows participants' performance on concepts related to phonemic awareness. Although majority of the teachers were able to define phonemic awareness (63%), and match similarities between initial sounds, their knowledge of most concept was lackluster. They had significant difficulties with sound discrimination; no participant managed to correctly identify the third speech sound in the word *prayer*. Similar problems were reported with words such as *higher* (8%), *thank you* (12%) and *boyfriend* (14%).

Table 3: Teachers' Knowledge on Phonemic Awareness

Description of Items	*(%)*
15. Write down the third speech sound in each of the following words:	
(a) Boyfriend	14.00
(b) Prayer	0.00
(c) Thankyou	12.00
(d) Higher	8.00
16. A phoneme refers to…	63.00
17. Say the word 'cat' without the /k/ sound	28.00
18. Identify the paired words that begins with the same sounds	66.00
19. If you say the word and reverse the order of sounds *ice* would be	30.00
20. If you say the word and reverse the order of sounds *enough* would be	24.00
21. Phonemic awareness is …	29.00
22. How many speech sounds are in the following words	
(i) box	13.00
(ii) grass	24.00
(iii) ship	59.00
(iv) moon	64.00
(v) brush	19.00
(vi) knee	51.00
(vii) through	47.00

The participants also experienced some problems with phoneme discriminating in words such as *box* and *brush*, on which only 13% and 19% of the sample participants managed to successfully identify the number of individual phonemes in each target words respectively. Other phonemic awareness tasks that posed challenges were sound deletion (deleting the

sound /c/ from *cat* to create *at*) and sound reversal (reversing the sounds in *enough* to come up with *fun*).

3.1.3. Teachers' Knowledge of Phonological Awareness

Table 4 below depicts teachers' knowledge of phonological awareness. Generally, unlike other aspects of the reading process reviewed above, our participants seem to have an average understanding of the language constructs. Fifty-eight percent were able to define what phonological awareness is. Similarly, good proportions of teachers managed to determine the number of syllables in words like *teacher* (63%), *disassemble* (58%), *pedestal* (53%) and *observer* (49%). However, identifying the number of syllables in the words like *frogs* and *heaven* seem to be more challenging for teachers.

Table 4: Teachers' Knowledge of Phonological Awareness

Description of Items	*(%)*
23. Phonological awareness is …	58.00
24. Determine the number of syllables in each of the words below;	
(a) *disassemble*	58.00
(b) *heaven*	39.00
(c) *observer*	49.00
(d) *pedestal*	53.00
(e) *frogs*	22.00
(h) *teacher*	63.00

3.1.4. Teachers' Knowledge on Morphological Awareness

Seventy-two percent of the participants were able define what a morpheme is and correctly identified the numbers of morphemes in the target words presented in the stimulus. Table 5 shows the specific proportions of participants who correctly identified morphemes in the following words; *teacher (50%), heaven* (47%), *disassemble* (37%), *frogs* (36%), *observer* (27%) and *pedestal* (21%).

Table 5: Teachers' Knowledge on Morphological Awareness

Description of Survey Items	*(%)*
24. Determine the number of morphemes in each of the words below	
(a) *disassemble*	37.00
(b) *heaven*	47.00
(c) *observer*	27.00
(d) *pedestal*	21.00
(e) *frogs*	36.00
(f) *teacher*	50.00
25. A morpheme refers to …	72.00

Based on these results, it can be argued that the performance of the participants fluctuated as a function of word frequency. For instance, they excelled more on frequently used everyday words such as *teacher* and *heaven*, but only a small proportion managed to determine the number of morphemes in the less frequent used like *pedestal.*

3.2 Self-Perception Regarding the Basic Language Constructs

In addition to evaluating teachers' knowledge of concepts that support the development of reading skills, their self-efficacy was assessed with view of determining its association with their competence. The results of how teachers' belief about their knowledge of the key language concepts required for effective teaching of reading were displayed in Table 6 below. On average, participants perceived their knowledge of the basic language concepts of literacy being *very good.* With the exception of phonemic awareness, about 60% of the participants rated as being *very good* in their knowledge of phonics, fluency, reading comprehension, and vocabulary. Interestingly, no participants classified him/herself as having *minimal* knowledge of vocabulary and only 1.10% in phonemic awareness. Contrastingly, more than 12.20% and 7.80% consider themselves *experts* in phonics and reading comprehension.

Table 6: Participants' Perceived Knowledge on Basic Language Constructs

Basic Language Constructs	*Minimal*	*Moderate*	*Very Good*	*Expert*
Phonics	3 (3.30%)	22 (24.4%)	54 (60.0%)	11 (12.2%)

Phonemic Awareness	1 (1.10%)	29 (32.2%)	53 (58.9%)	7 (7.80%)
Fluency	3 (3.30%)	29 (32.2%)	55 (61.1%)	3 (3.30%)
Vocabulary	0 (0.00%)	32 (35.6%)	54 (60.0%)	4 (4.40%)
Reading Comp	4 (4.40%)	21 (23.3%)	58 (64.4%)	7 (7.80%)

3.2 How Teachers' Self-Efficacy compares to their Knowledge of Basic Language Constructs

Generally, results show substantial variations between participants' actual knowledge and the teachers' own perception of their appreciation of the basic language constructs of literacy. To further appreciate the nature of the differences between knowledge levels and self-efficacy, Pearson correlation analyses among the variations in the model. The results were shown on Table 7 below. The results did not show any statistically significant bivariate associations between the variations permutations in participants' knowledge levels and their self-efficacy ($p > 0.05$).

Table 7: Bivariate Correlations between Teachers' Perceived Knowledge and Actual Performance.

Variables	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1 Phonics R	1.00								
2 Phonics P	-0.13	1.00							
3 P/Awareness R	0.44**	0.03	1.00						
4 P/Awareness P	-0.02	0.41**	-0.06	1.00					
5 Fluency R	0.24*	0.10	0.32**	-0.01	1.00				
6 Vocabulary R	0.29**	-0.02	0.32**	-0.06	0.34**	1.00			
7 Phonological P	0.06	0.10	0.05	0.34**	-0.03	0.02	1.00		
8 Comprehension R	0.17	0.01	0.45**	-0.20	0.37**	0.22*	-0.12	1.00	
9 Morphological P	0.04	0.20	-0.01	0.44**	-0.07	-0.14	0.53**	-0.15	1.00

Note: ** = $p < 0.01$(2-tailed); *= $p < 0.05$ level (2-tailed); R= teacher ratings; P = teacher performance

This implies that while participants perceived themselves as being *very competent* in language constructs, their actual knowledge did not follow as similar trajectory. However, as expected, all within-domain (e.g., teacher rating versus teacher rating and vice versa) bivariate correlation coefficients were highly associated and statistically significant. In summary, the average grade 1 teacher charged with the responsibility of ensuring that novice learners are well-taught into proficient readers in Zambia, or more specifically in Lusaka District, were poorly-equipped, although they thought were highly knowledgeable.

DISCUSSION AND CONCLUSIONS

The purpose of this study was threefold; to determine grade 1 teachers' knowledge levels of basic language constructs of literacy in Zambia, to evaluate teachers' own perception of their knowledge of language constructs, and determine the interaction between their knowledge and self-efficacy of the language concepts under consideration. The results show that teachers' knowledge of basic language constructs key to literacy development is significantly low to support effective instructions. However, they rated knowledge of the same constructs very highly. This was in stark contrast to their actual knowledge of language concepts. Predictably, the correlations between teachers' knowledge of these concepts and their self-efficacy were not statistically significant, although the within-domain associations were closely interrelated.

Grade 1 reading teachers seem to have more difficulties with phonemic awareness— ability to hear and manipulate the **smallest units of sound** in spoken language which unfortunately was supposed to be easiest of the four components of reading process, while phonological awareness—the ability to hear and manipulate units of sounds in spoken language—was

their easiest (Munro, 1998). Showing poor understanding of only one of these two concepts is counter-intuitive because both sets of skills focus on phonological aspects of language, thus an understanding of one of these concepts should automatically lead to the other. In a nutshell, these results mimic findings from several studies evaluating pedagogical content knowledge (Bos, et al 2001; Cheesman et al 2009; Cunningham et al., 2004; Cunningham et al., 2009; Kaani, 2018; Moats, 1994; Washburn et al., 2011). Like Kaani's (2018) findings in the general population of in-service teachers which show that teachers lacked explicit knowledge related to reading instructions, grade 1 teachers were equally deficient.

On the other hand, teachers' high perception of their knowledge of basic language constructs in all the four categories of assessments were consistent with Stark et al. (2015) who found no statistically significant relationship between self-perception of their abilities and knowledge. Further, Bos et al. (2001) reported that reading educators, both in-service and pre-service, expressed positive attitudes toward explicit and implicit code instruction, but demonstrated limited knowledge of phonological awareness and phonics, which indicated that there was a mismatch between what educators believed and what they knew. The fact that grade 1 teachers are aware of what the appropriate content for effective teaching of reading and development is and expressed very high perceptions of their skills, but showing poor content knowledge is quite worrisome and needs addressing comprehensively and urgently (Fielding-Barnsley & Purdie, 2005).

The observed mismatch in teachers' knowledge and their self-perception, and also corroborated by Kaani (2018) in Zambia, speaks to poor teacher education practices that do not provide a more systematic training in language concepts key to literacy development. Binks-Cantrell (2008) found when college teacher trainers are deficient in language constructs needed for effective reading instructions (Moats, 1999; 1994; Snow, Griffin & Burns, 2005), the student teachers graduating from such colleges experience influence of the Peter Effect, which states that trainers who are not well-endowed in pedagogical content knowledge cannot be expected to produce knowledgeable teachers (Binks-Cantrell et al., 2012; Washburn et al., 2011). Thus, graduate teachers are deprived of the opportunity to acquire appropriate knowledge and pedagogical skills. Banja and Mulenga (2019) cited systemic problems in higher education institutions as some of the main culprits implicated in poor quality of teacher graduates in Zambia. The basic knowledge teachers showed in this study may have been self-taught or based on their classroom experiences.

The main conclusion is that grade 1 teachers exhibit limited knowledge and understanding of important language concepts, despite having high perceptions of their abilities. Teachers show significant deficiencies in all aspects of language related to reading and its teaching. Secondly, no correlation exists between teachers' performance and their perceived knowledge of language constructs. Based on these findings, the foregoing discussion, it was recommended that: the curriculum designers through the Ministry of Education should consider explaining more of those difficult concepts highlighted in this study both in the curriculum and teachers' guide books.

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