A Study of Perceptual Skills in Arabic-speaking School-aged Children

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Abstract

The auditory and visual perceptual skills (AVPS) are looked at as essential components in the progression of early reading skills (ERS) that form the basis for later academic success. The current study aimed at examining the sequential acquisition of the continuum of perceptual skills in Arabic-speaking school-aged children ranging from grade I to grade VIII. An overall number of 480 typically developing children were equally selected from the government and private schools. The descriptive analysis revealed that both male and female participants of the two schools showed same performance across all the sections. Results revealed that statistically significant differences existed in the performance of children of government school (lower socioe-conomic status— LSES) compared to children of private school (higher socioe-conomic status— HSES). Results also revealed a significant difference in the performance of students of different grades. The performance of children improved from the lower grades to the higher grades across all the sections.

Introduction

Reading is known as a developmental cognitive process through which meaning can be inferred from a written text. The reading process comprises two main elements: decodings, the ability to recognise familiar words, and comprehension, the capability to simultaneously extract and construct meaning from

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a written text (Shaywitz, 2003). The reading skills or literacy experiences children acquire earlier in their life have been described as the 'doorkeeper' towards attaining later competency and proficiency (Snow et al., 2007).

The process of identification and explanation of knowledge possessed through vision is called visual perception (VP). VP is a process in which we gain more awareness and comprehend our surroundings better. It is crucial to know how to join letters to make up words. The process of identification and explanation of knowledge possessed through the sense of hearing is called auditory perception (AP). AP is defined as the capability to recognise, arrange and interpret knowledge received via the sense of hearing.

Review of Literature

Auditory and Visual Perceptual Skills (AVPS) are considered significant components in the evolution of ERS in young learners (Dechant and Smith, 1961). A vast number of studies have manifested that inadequate sensory-perceptual growth of children joining school yearly may lie behind their learning disabilities that hinder their success later in their academic progression (Oakland et al., 1973). Ample number of studies have shown that young learners undergoing reading deficits face trouble with the essential cognitive reading skills related to VP and assured its remarkable influence on academic performance in young learners (Çayir, 2017; Stokes et al., 2015). It has been viewed that there is an obvious correlation between AP and early reading performance (Rosner, 1972). A study performed on the relationship between AP and reading achievement in preschool children revealed that AP is a strong predictor of future reading competency among students (Burrows and Neyland, 1978).

Keeping these facts in mind, the current study was conducted in the Sana'a district of Yemen to discover some of the issues pertaining to the reading skills of the Arabic-speaking children of Yemen. Basic education in Yemen consists of nine years of obligatory education for students aged 6 to 14. Education in Yemen is provided by the public sector (government schools, i.e., the schools run by the government of Yemen) as well as the private sector (private schools, i.e., the schools run by private organisations or individuals).

Arabic is spoken by nearly 420 million people worldwide (Gordon, 2005). Arabic is categorised as a Semitic language with an abjad script based on consonants. It has all the consonants in addition to three long vowels (a, u, and i). Whenever Arabic writing is totally vowelised, the grapheme-phoneme connection is extremely regular, and it has been known as transparent orthography. In contrast, it has been said that partly vowelised Arabic writing that lacks short vowels, is non-transparent and 'extremely opaque' (Saiegh-Haddad

and Henkin-Roitfarb, 2014). Arabic is a language with a diglossic structure (Ferguson, 1959). Modern Standard Arabic (MSA) can only be acquired through formal education and is used solely in official contexts such as textbooks, schooling, and official speech. In informal contexts, the Spoken Arabic Vernacular (SAV) is the primary mode of communication.

Need for the Study

In the evolution of the majority of academic abilities, it is widely supposed that the earlier it was, the better it will be (Jordan et al., 1985). Reading is one of the ultimate significant academic processes that children learn earlier in their academic life. Learning how to read is extremely difficult. Nearly about 10 per cent of the children are suffering from a developmental deficit called dyslexia (Gabrieli, 2009). It is generally assumed that children who encounter difficulty in the AVPS earlier as young learners will suffer later to be skilled readers; thus, their educational performance will not be as per the estimated levels (Duru, 2008).

In order to address these issues, few attempts have been made based on the Informal Diagnostic Test of early reading skills proposed by Rae and Potter (1973). Some assessment tools were developed to assess early reading skills for the identification of children with reading deficits (Joshi, 2016; Priyadarshi and Goswami, 2012). However, these tools were translated and adapted into languages other than Arabic.

Aim of the Study

The main aim of the current study is to examine the sequential acquisition of the continuum of perceptual skills in Arabic-speaking school-aged children of Classes I to VIII. In this direction, an attempt was made to answer the given questions:

1. Do auditory-visual perceptions levels differ in terms of gender?
2. Do auditory-visual perceptions levels differ in terms of the type of school?
3. Do auditory-visual perceptions levels differ in terms of the student's class?

Method

Sample

For the current study, Arabic-speaking children living in Sana'a district of Yemen of Classes I to VIII, with an age range between 6–13 years were recruited. An overall number of 480 Typically Developing Children (TDC), i.e., the normal healthy children without any deficits linguistically or/and neurologically, participated in the study.

Another important requirement was that children should not have changed their school since the beginning of their schooling years. Moreover, children should not have failed in only clean throughout their schooling years. At the time of conducting the study, students

should have completed nearly six months in the running academic year. The participants of this study were selected from the government schools and private schools, 30 students from each grade (15 males and 15 females). And the participants in these two groups to some extent depict a Low Socios economic Status (LSES) and a High Socio-Economic Status (HSES) respectively. The Kuppuswamy scale criteria by Kumar et al. (2012) were used to measure the participants' SES.

Instrument

The basis of this study is the section on the perceptual skills development from the Informal Diagnostic Test of early reading skills proposed by Rae and Potter (1973) Informal reading diagnostic in *A Practical Guide for the Classroom Teachers* republished in the year 1981. The stimulus was adapted to Arabic culture and language. It included AVPS as the main content; it was further divided into two subsections: AP and VP. The AP section was further divided into auditory identification level (AIL), auditory recall level (ARL), and auditory discrimination level (ADL). The VP section was further divided into two separate levels: Visual Discrimination Level 1(VDL1) and Visual Discrimination Level 2 (VDL2).

Procedure

Prior to the assessment, participants were informed regarding the purpose of the study in order to follow the ethical considerations, and informed consent was also obtained from the principals of the schools.

The stimulus was applied to 480 TDC. Each child was introduced to the stimulus alone in a quiet room for about 20 minutes. The stimulus was given to the child in a particular order and all the sessions were audio-video recorded. For the sake of obtaining homogeneous data socio-demographically, children who attended schools in the same geographical area in Sana'a Yemen were included in the study.

Scoring

A general scoring method was applied and a score of one was designated for every correct answer. The ultimate result for each subsection depended upon the number of elements in it.

Results

The collected data was decoded in SPSS version 26.0. For statistical analysis, $p < 0.05$ level was considered as the level of significance. To test normality, Shapiro-Wilk test was performed. The descriptive analysis of the data set revealed that some of the parameters were normally distributed and some were not, so non-parametric tests have been used for descriptive statistics. The Mann–Whitney U test was performed for gender comparisons. Findings revealed that there was no statistically significant difference in terms of gender ($p > 0.05$). Therefore, gender was combined for further analysis. Moreover, the Mann-Whitney U test was performed to find

out the significant difference between the private and government schools. The non-parametric Kruskal Wallis test was done for the comparison of different. Results revealed a significant difference between grades; therefore, a Mann-Whitney U test was performed to see the pairwise significant difference between grades.

It is apparent from the descriptive analysis in Table 1 that children in the higher grades performed better than the lower grades' children, i.e., the performance of the children gradually improved from lower to higher classes across all AVPS tasks.

It is apparent from Table 2 that children in the higher grades performed better than the lower grades' children. The performance of the children gradually improved from lower to higher grades. The comparative analysis of the mean (μ) and standard deviation (SD) values of TDCG and TDCP, as shown in Table 1 and Table 2 revealed that TDCP outperformed TDCG almost across all AVP sections. However,

Table 1
Mean and Standard Deviation of TDC of the Government School

AVPS											
		AP						***VP***			
		AIL		**ARL**		**ADL**		**VDL1**		**VDL2**	
Grade	**Gender**	**μ**	**SD**	**μ**	**SD**	**μ**	**SD**	**μ**	**SD**	**μ**	**SD**
I	M	20.73	6.319	22.73	3.693	18.73	5.203	12.13	1.598	11.87	2.295
	F	21.33	6.758	21.73	5.133	18.93	5.612	12.73	1.710	12.13	2.669
II	M	24.13	3.758	24.20	3.005	23.27	4.992	13.67	1.175	13.00	2.000
	F	24.93	4.543	24.67	2.870	23.53	5.222	13.67	2.193	13.40	2.640
III	M	26.67	2.257	26.53	2.066	24.47	3.502	14.93	0.884	14.13	1.885
	F	26.87	2.264	26.80	1.656	25.67	4.577	14.87	1.246	14.53	2.503
IV	M	27.53	0.915	27.60	0.737	26.20	3.590	15.27	1.033	20.00	2.299
	F	27.73	0.704	27.80	0.414	26.33	3.994	15.33	0.816	20.47	2.748
V	M	27.80	0.561	27.80	0.561	27.53	3.292	15.40	1.549	21.87	2.850
	F	27.87	0.516	27.93	0.258	27.93	3.918	15.53	0.915	22.27	2.017
VI	M	27.93	0.258	27.93	0.258	28.93	1.387	15.67	0.816	23.47	0.743
	F	27.93	0.258	27.93	0.258	29.40	0.910	15.73	0.458	23.73	0.594
VII	M	28.00	0.000	28.00	000	29.67	0.617	15.80	0.414	24.00	0.756
	F	28.00	0.000	28.00	0.000	29.73	0.458	15.87	0.352	24.47	0.516
VIII	M	28.00	000	28.00	000	29.93	0.258	15.93	0.258	24.87	0.352
	F	28.00	0.000	28.00	0.000	30.00	0.000	16.00	0.000	24.93	0.258

Note: μ = Mean, SD= Standard deviation, M= Male, F= Female

Table 2
Mean and Standard Deviation of TDC of the Private School

AVPS											
		AP						*VP*			
		AIL		ARL		ADL		VDL1		VDL2	
Grade	Gender	μ	SD	μ	SD	μ	SD	μ	SD	μ	SD
I	M	25.33	6.218	22.87	3.420	18.07	3.751	12.93	2.492	13.00	2.390
	F	25.47	2.696	23.13	4.324	19.13	5.235	13.33	2.059	13.33	2.469
II	M	27.60	0.737	25.87	2.997	23.53	2.100	14.20	1.656	14.07	1.944
	F	27.13	2.134	25.93	2.017	23.93	4.992	14.40	2.444	14.20	3.052
III	M	27.87	0.352	27.87	0.352	25.47	3.044	14.73	1.486	14.87	1.807
	F	27.87	0.352	27.87	0.352	25.87	2.615	14.80	1.897	14.93	1.870
IV	M	27.93	0.258	27.93	0.258	27.60	1.993	15.47	0.516	20.67	2.440
	F	27.93	0.258	27.93	0.258	27.93	1.223	15.73	0.458	20.73	2.282
V	M	28.00	000	28.00	0.000	29.87	0.352	15.67	0.617	22.73	1.387
	F	28.00	0.000	28.00	0.000	29.87	0.352	15.73	0.458	22.87	1.552
VI	M	28.00	000	28.00	0.000	29.87	0.352	15.87	0.352	24.13	0.516
	F	28.00	0.000	28.00	0.000	29.93	0.258	15.80	0.414	23.93	0.799
VII	M	28.00	000	28.00	0.000	30.00	0.000	15.93	0.258	24.73	0.458
	F	28.00	0.000	28.00	0.000	30.00	0.000	15.93	0.258	24.87	0.352
VIII	M	28.00	000	28.00	0.000	30.00	0.000	16.00	0.000	25.00	0.000
	F	28.00	0.000	28.00	0.000	30.00	0.000	16.00	0.000	25.00	0.000

Note*:* μ = Mean, SD= Standard deviation, M= Male, F= Female

TDCG outperformed their TDCP counterpart in the ADL for the 1st students (male) and VDL1 for the 3rd students (male and female). As was the case in the descriptive analyses, TDCP outperformed TDCG with children of the private school scoring a maximum score by about two grades earlier than their government school counterparts did. Children of the government school performed equivalent to their private school counterparts approximately in the Grades VII and VIII.

Table 3 clarifies the level of significance between the government and private schools. It is apparent that in case of Class I, a statistically significant difference was found in the AIL (p<.0.05, sig=001). For Grade II, significant differences existed in the AIL (p <0.05, sig=000) and ARL (p< 0.05, sig=033). In case of Grade III, significant differences existed in the AIL (p< 0.05, sig=038) and ARL (p< 0.05, sig=001). For Grade IV, there were no statistically significant differences across all parameters. In case of Grade V, there were no statistically significant differences across all parameters except that for ADL (p< 0.05, sig=002). In the case of Grade VI, there were statistically significant differences

Table 3
Government School vs Private School within Grades

Grade	Level of Significance Between the Government and Private Schools				
	AIL	***ARL***	***ADL***	***VDL1***	***VDL2***
I	0.001*	0.542	0.870	0.098	0.104
II	0.000*	0.033*	0.624	0.089	0.54
III	0.038*	0.001*	0.812	0.596	0.150
IV	0.109	0.066	0.481	0.338	0.540
V	0.078	0.078	0.002*	0.863	0.370
VI	0.154	0.154	0.002*	0.489	0.009*
VII	1.000	1.000	0.003*	0.232	0.000*
VIII	1.000	1.000	0.317	0.317	0.078

*Indicates significance at p< 0.05

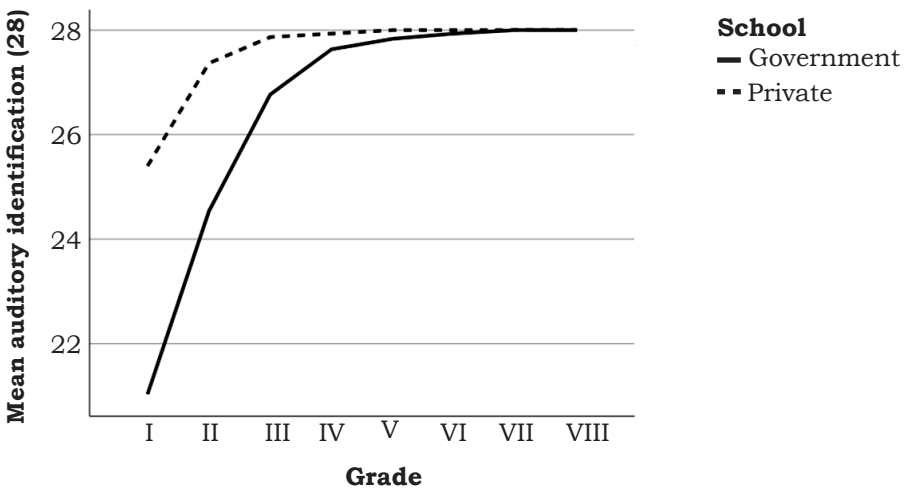

Fig. 1: Pairwise Comparison of Grades for TDCG and TDCP in the AIL

between the two schools in the ADL (p< 0.05, sig=002) and VDL 2 (p< 0.05, sig=009). For Grade VII, there were statistically significant differences in the ADL (p< 0.05, sig=003) and VDL 2 (p< 0.05, sig=000). In case of Grade VIII, significant differences were found across all the sections, statistically.

The independent samples Kruskal-Wallis test was carried out across grades (pairwise comparison of grades). Results revealed an overall grade significant difference (p<0.05).

Figure 1 shows the comparative performance of TDCG in the AIL, a significant difference between grades existed ($x^2(7)$ =133.101, p<0.05). The pairwise comparison of grades for TDCG revealed that there was no significant difference between the

Grades I and II (p >0.05). A significant difference was found between Grade I and all the other grades except the Grade II. Grade II was significantly different from all the other grades except the Grade I. No significant differences were observed between the Grades III, IV, V, VI, VII and VIII (p>0.05). Figure 1, also shows the comparative performance of TDCP in the AIL; a significant difference was found between grades ($x^2(7) = 56.592$, $p<0.05$). The pairwise comparison of grades showed that the performance of Grade I was different from all other grades except Grade II. The performance of Grade II was different from all other grades except Grades I, III, and IV. No significant differences between Grades I and II, Grades II and III, and Grades II and IV were observed. Statistically significant differences were observed between Grades I and II and other grades. Grade I performed differently from the Grades III, IV, V, VI, VII and VIII. Grade II was different from Grades V, VI, VII and VIII. No significant differences among the Grades III, IV, V, VI, VII and VIII were found.

With respect to the ARL, the comparative performance of TDCG in Figure 2 indicates a significant difference between grades ($x2(7) = 140.530$, $p<0.05$). The pair-wise comparison of grades showed that the performance of Grade I was different from all other grades except Grade II. The performance of Grade II was significantly different from all other grades except Grades I and III. The performance of Grade III was different from Grades I, VI, VII and VIII. No significant differences between the Grades IV, V, VI, VII and VIII were found (p>0.05). In Figure 2, the comparative

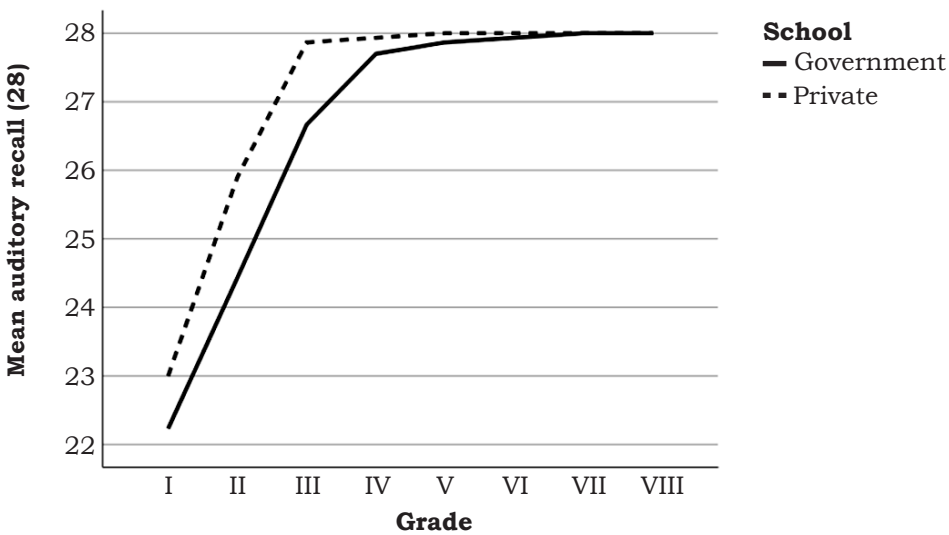

Fig. 2: Pairwise comparison of grades of TDCG and TDCP in the ARL

analysis of the private school children's performance in the ARL indicates a significant difference between grades ($x^2(7) = 150.924$, $p<0.05$). The pairwise comparison of grades showed that there was no significant difference between the Grades I and II. The performance of Grade I was different from the Grades III, IV, V, VI, VII and VIII. Further, significant differences between Grade II and Grades III, IV, V, VI, VII and VIII were observed. For the Grades III, IV, V, VI, VII and VIII, no statistically significant differences were found ($p>0.05$).

In case of ADL, Figure 3 shows the comparative performance of TDCG; a significant difference existed between grades ($x2(7) = 130.880$, $p<0.05$). The pairwise comparison of grades showed that the performance of Grade I was different from all other grades except Grades II and III. No significant differences between the Grades I, II and III were found. Grade I was different from the Grades IV, V, VI, VII and VIII. Grade II was different from Grades V, VI, VII and VIII. Grade III was statistically significant different from the Grades VI, VII and VIII. Further, the Grade IV was different in the performance from Grades I, VII and VIII. No significant differences were observed between Grades V, VI, VII and VIII. With respect to TDCP, It is clear in Figure 3 that the comparative performance of grades in the ADL showed significant differences between grades ($x^2(7) = 197.312$, $p<0.05$). The pair-wise comparison of grades revealed that there was no significant difference between Grades I and II. No significant differences between Grade II and Grades I, III and IV were observed. The Grade III was

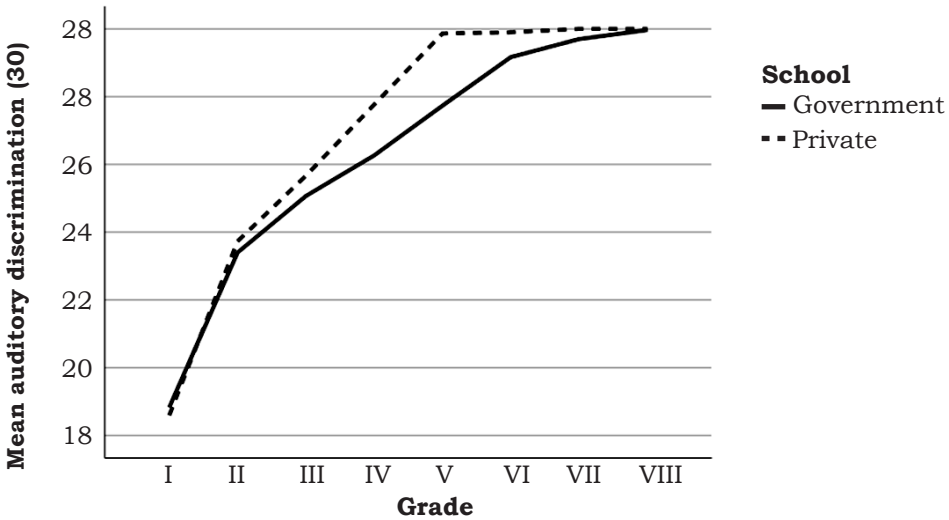

Fig. 3: Pairwise comparison of grades for TDCG and TDCP in the ADL

significantly different from all except the Grades II and IV. The Grade IV was different from Grades I, V, VI, VII and VIII. For the Grades V, VI, VII and VIII no significant differences were found ($p>0.05$).

For the VDL1, the comparative analysis of the TDCG in Figure 4 indicates a significant difference between grades ($x^2(7) = 121.731$, $p<0.05$). The pairwise comparison of grades showed that Grade I was significantly different from all grades except Grade II. Grade II was different from all other grades except Grades I and III. The performance of the Grade III was significantly different from the Grades I, VII and VIII. For the relation between the Grades IV, V, VI, VII and VIII no significant differences were observed. In case of TDCP, the comparative performance of grades in the VDL 1 as shown in Figure 4, clearly showed significant differences between grades ($x^2(7)=91.563$, $p<0.05$). The pairwise comparison of grades showed that there was no significant difference between Grades I and II. No significant differences between the performance of Grade II and Grades I, III and IV were found. The performance of Grade I was significantly different from Grades III, IV, V, VI, VII and VIII. Grade II was different from Grades V, VI, VII and VIII. The performance of the Grade III was different from the Grades I, VII and VIII. For the relation between the Grades IV, V, VI, VII and VIII, no statistically significant differences were found.

In case of VDL 2, Figure 5 shows the comparative analysis of TDCG. It is apparent that there was a significant difference between grades ($x^2(7) = 205.794$, $p<0.05$). The pairwise

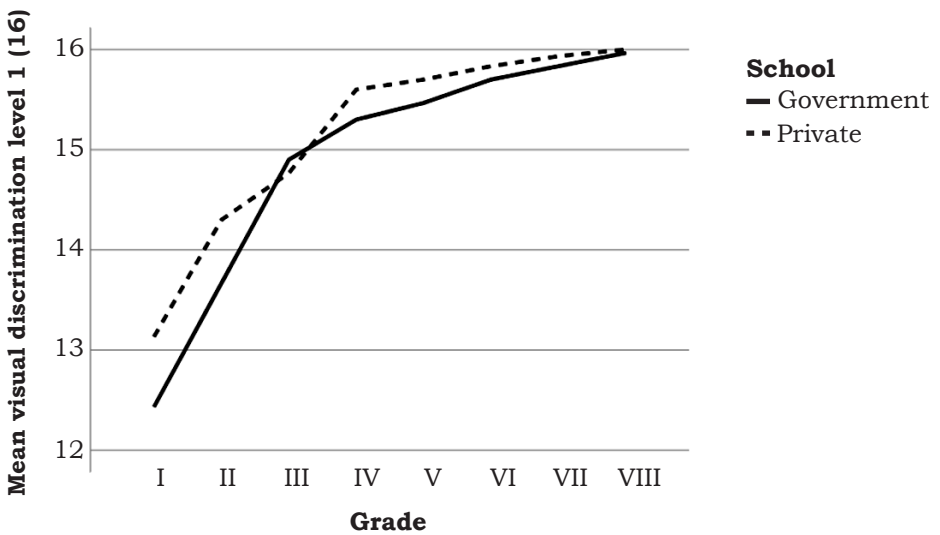

Fig. 4: Pairwise comparison of grades for TDCG and TDCP in VDL1

comparison of grades showed that Grade I performed differently from all the grades except Grades II and III. Grade II was different from all the other grades except Grades I and III. Grade III was different from all grades except Grades I, II and IV. Grade IV was different from Grades I, II, VII and VIII. Grade V was different from the Grade VIII. For VDL2, the comparative performance of the TDCP as shown in Figure 5, shows that there was a significant difference between grades ($x^2(7) = 212.202$, $p<0.05$). The pairwise comparison of grades also showed that Grade I was different from all other grades except Grades II and III. Grade II was different from all except Grades I and III. The performance of Grade III was different from all other grades except Grades I and II. There were no significant differences between the Grades I, II and III. For the Grades IV, V and VI no significant differences were found. Further, for the Grades VI, VII and VIII, no significant differences were found.

Discussion

The descriptive analysis for the data set revealed that the collected data was symmetrical in the system of developing the perceptual skills. Looking at the means and standard deviations of the AVPS, a developmental pattern for the performance of children across all the sections was noticed. The performance of children in the higher grades was better than the performance of children in the lower grades. This is in line with the previous studies that reported that children acquire the fundamental literacy skills and behaviours in a

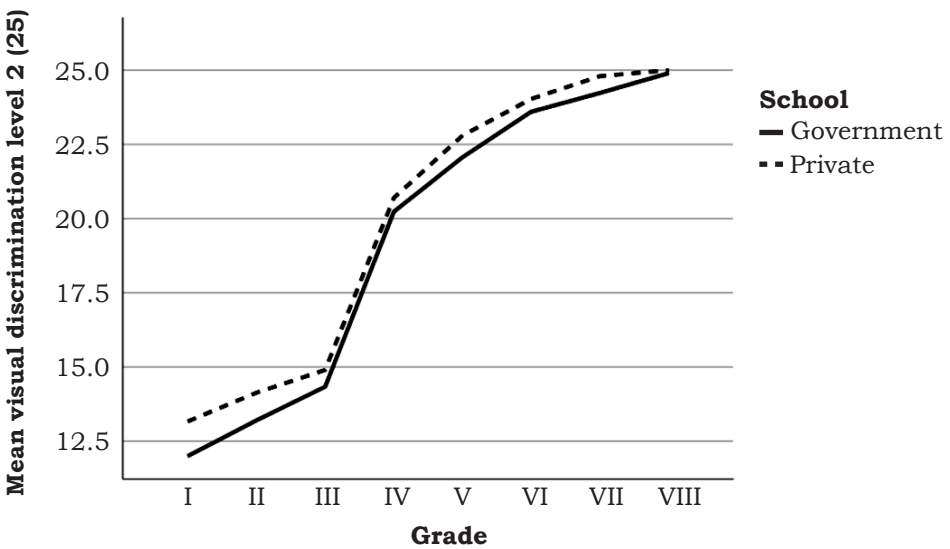

Fig. 5: Pairwise comparison of grades for TDCG and TDCP VDL2

homogeneous pattern (Cheung et al., 2006). This can be attributed to the education they get throughout their schooling.

As was the case in the descriptive analysis of the data set of the TDCG and TDCP schools separately, gender was found to be a non-significant variable. This is in accordance with a study done by Önder et al. (2019), which reported that students' VP levels do not differ based on gender. However, Van Wyk et al. (2020) found less to middle significant differences in the learners' VP abilities with respect to gender.

Whereas there was no statistically significant difference with regard to gender, a statistically significant difference was observed with regard to the type of schools. In this study, the differences between the type of schools (private and government) are assumed to be the impact of SES. As was the case in the descriptive analysis, TDCP outperformed TDCG. This clarifies the significant differences noticed in their performance across all sections; with private school (HSES) children scored maximum in Grade VI in all sections, whereas the government school (LSES) children scored a maximum of approximately two grades lower than their private school counterparts. Children from both government and private school performed as well as their private school counterparts approximately. In the Grade VII and VIII performed well. This is in agreement with a study conducted by Priyadarshi et al. (2012) that concluded that the differences in the performance of children studying in the English medium school, and the performance of children studying in the Hindi medium; with English medium children outperforming their Hindi medium counterparts, may be considered as being the impact of HSES and LSES respectively. A study done by Deutsch (1964) confirmed that children belonging to HSES are good in visual skills compared to LSES children, who showed clear visual-perceptual disorders. Havaei' et al. (2009) proposed that children's AVPS are influenced by their traditions and schooling background. A person's SES is affected by his/her health, relation with the community (Şeker, 2015); thus life kind this may be the reason behind this divergence. Children belonging to HSES may have been exposed to a wealthy visual environment throughout their childhood period. This assists in developing their visual working memory that highly relies on their perceptual progress.

Findings showed that statistically significant differences were observed approximately across all parameters between grades ($p < 0.05$). However, no significant difference was found between the Grade I and II. Results showed a stable improvement in the achievement of the learners from grade I onwards. This is in contrast with a study conducted by Ku and Anderson (2003) that has inspired that variation in the children's performance at the AVPS mirrors individuals' variations

in reading abilities. The progressive increasing pattern across all grades of both private and government schools reaching nearly similar scores in the higher grades as noticed in the current study, is in consonance with a study conducted by Hoien et al. (1995), which reported a stable improvement in the performance of students from the lower to the higher grades. Additionally, Priyadarshi and Goswami (2012) proposed that the total achievement in reading is connected with the age of the learner. The progressive increase in the learners' achievement noticed in this study can be attributed to their ages and years of schooling.

Limitations

There are some limitations concerned with this study which must be highlighted in order to generalise the results. First, the sample size of the subgroups was small for a population. It is assumed that further research with a bigger and more varied sample may increase the possibility to get a more typical distribution of the target group. This may permit to generalisation and transferring of the findings. Another limitation that cannot be ignored was the cross-sectional nature of the current study design. It is highly recommended to conduct a longitudinal study to examine such relationships, noticing and recording the sequential development in the children's performance.

Implications

It is generally assumed that perceptual skills are strong predictors of future reading success. This calls attention to the value of early identification and assessment of AVPS in young learners with learning difficulties. Assessing the AVPS may bring forward the efficiency of early intervention and assistance to provide diagnostic lessons in order to help children to overcome their difficulties earlier in their academic life and become successful learners. The results of the current study led to various dimensions for further research in this direction. It also leads to the need for a longitudinal study to evaluate the diverse unconstrained variables that may play a role throughout data collection such as parental impact, educational instructions, teachers' attitudes, and the learners' maturity.

Conclusion

The current study sought to understand the sequential acquisition of the AVPS as a crucial factor for later academic achievement. This sheds light on the value of early identification and assessment of the perceptual skills in school-aged children with learning difficulties, in an attempt to provide a quick intervention to help the children overcome these difficulties and become successful learners.

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