

Relationship of Perceptual Abilities with Academic Performance of Children

Rajni Dhingra, Sarika Manhas and Nidhi Kohli

*P.G. Department of Home Science, University of Jammu, Jammu 180 006,
Jammu and Kashmir, India*

KEYWORDS Visual Perception. Auditory Perception. Kinesthetic Perception. Tactile Perception. Academic Performance. Correlation

ABSTRACT This study investigates the relationship that exist between the perceptual abilities and the academic performance of children. Perceptual abilities in four areas – visual, auditory, kinesthetic and tactile were assessed and their relationship with three academic areas – reading, spellings and mathematics was explored. The sample comprised of 200 academic underachievers studying in classes' 4th – 6th, selected from 59 schools across Jammu block. Stratified sampling technique was used for sample collection. The results reveal that on the whole the academic performance was significantly correlated with three perceptual abilities – visual, auditory and kinesthetic. When considered separately, reading and spelling both were significantly associated not only with one another but also the three already mentioned perceptual areas. On the other hand, mathematic was found to be significantly correlated with only auditory and visual perception.

INTRODUCTION

A significant number of children fail to perform adequately in academics without any apparent limitation. In a considerable number of these incidences, there is a discrepancy between the children's potential and their actual performance. One of the paramount justifications offered for such poor academic performance are disorder in one or more of the basic psychological processes (Fuerst and Rourke 1998; Fuchs and Fuchs 2002). Defects in psychological process which include cognitive abilities in perception, language, memory, attention, concept formation, problem solving, and the like act as intrinsic limitations or deficiencies that interfere with the child's learning (Hinshaw 1992; Monteil et al. 1996; Parkash 1999). The dysfunction affects one or more cognitive process instead of obstruction of overall intellectual ability.

Perception is the cognitive process that identifies, organizes, and translates sensory data into meaningful information. Perceptual processes include discrimination, coordination and sequencing (Rourke 2005). There are children who may experience difficulties in any of these areas of

perceptual processing. The perceptual disorders include disorder of visual, auditory, tactual or kinesthetic perception. The student with visual/auditory perceptual problem will find it very difficult to copy letters correctly or to perceive the difference of sound of the front door bell and the first ring of the telephone. These children cannot interpret sensations in a normal manner (Nakra 1997).

The widely used term *perceptually handicapped child* stems from the abnormalities such children have with perception. The idea of "perceptual deficits" has long been linked to learning disabilities (Overton 1992). Several constructs of perception that have implications for academics are: the perceptual – modality concept, overloading the perceptual modalities, whole and part perception, visual perception, auditory perception, tactile perception, kinesthetic perception, cross – modal perception, form and directional perception, and social perception (Asthana and Verma 1992; Reddy et al. 2000). Empirical evidences have linked perceptual disturbances to failure to learn, particularly at the early stages of academic instruction (Asthana and Verma 1992; Nakra 1997; Kulp et al. 2004). Typically, these students suffer from an auditory processing problem, visual perception problem or attention deficit disorder, or display difficulty in following a sequence of verbal direction (Vaidya 1993). Researches reveal the perceptual processing disorders not only as a correlate of

Address for correspondence:

Dr Sarika Manhas

P.G. Department of Home Science, University of Jammu,
Jammu 180 006, Jammu and Kashmir, India

Mobile: 9906070001, 9906090001

E-mail: dr_sarika@sify.com

learning problem but also that children learn by using various perceptual channels. Many students with learning problems appear to have a much greater facility in using one perceptual channel than another; in additions, a particular perceptual channel may be so inefficient for certain individuals that it is an unproductive pathway of learning (Dunn and Griggs 1995).

The present study focuses on the four perceptual abilities-visual, auditory kinesthetic and tactile-and the academic performance of the children. The main purpose was to assess the relationship that exists between academic performance and perceptual abilities of school children. The role of the four perceptual channels was studied mutually at a time on the academic areas – reading, spelling and mathematics. Such studies are rare in our Indian context, as majority of the researches here tend to relate academic performance to intelligence, to socio economic status or the classroom environment. Little attention is paid to the influence of cognitive processes in shaping the academic outcomes.

MATERIALS AND METHODS

Sample

The sample consisted of 200 academic under-achievers having no apparent cause for under-achievement. The children were selected from a total of 597 students across the Jammu block (Jammu & Kashmir State) and were studying in classes 4th to 6th. The entire sample was obtained by employing stratified sampling procedure. Adequate representation was given to all the five educational subdivisions of the Jammu Block. If more the one section was available of a particular class then lottery method was employed and one section of each class i.e. 4th to 6th was selected. The students were screened for presence of any and all sorts of physical/ sensory defects, emotionally disturbances, mentally disorders, family disturbance and disadvantaged family environment. Only those children were selected for whose poor academic performance there were no obvious justifications available.

Tools

The tools used for data collections are clubbed under different heads.

1. For Exclusion Criteria: Raven's Colored

Progressive Matrices used to obtain I.Q scores, Child Behavior Checklist (Sood 1997) used to obtain a general behavioral profile of the children, observation and interviews for screening of children belonging to low SES, or suffering from physical or sensory deficiencies.

2. For Assessment of perceptual Abilities

a) *Visual Perception*: Three tools namely, Objects Assembly and Draw a Design subtests of McCarthy Scales of Children's Abilities and Pictures Completion subtest of WISC III R were used.

b) *Auditory Perception*: Digit Span of WISC III –R and verbal Memory of McCarthy scales of children's Abilities were put to use.

c) *Kinesthetic Perception*: Two subset of McCarthy Scales of Children's Abilities namely, Right and Left Orientation and Leg Coordination were used.

d) *Tactile Perception*: For the assessment of this are two self devised tests were used. The first test was based on the discrimination of temperatures while the second was based on the differentiation of the textures.

3. *Academic Task*: The academic performance of the children was assessed in three areas namely- reading, spelling and mathematics. The first two tests were bilingual (both English and Hindi) while the third was designed only in English. The reading and spelling test consisted of a set of ten words each in the two languages selected randomly from the textbooks used at schools. The informal graded word list was prepared from class 1st to 6th to assess the sight-reading and spelling performance of the children. Mathematics consisted of problems based on simple addition, subtraction, multiplication and division and were related to every day experience.

Data Analysis

For the analysis of the data primarily quantitative procedures were used. Appropriate statistical procedures such as the calculation of the mean, standard deviation, coefficient of correlation and percentile scores were employed where required.

RESULTS

The results reveal that on the whole, out of the 200 children selected as part of the sample group 60.5% were boys while the remaining 39.5%

were girls. Further 41.5% of the children were studying in class 6th, 32% in class 5th and only 26.5% cases were found to be in class 4th. This trend reveals that comparatively higher number of cases were derived from the higher classes. These children were identified from a total of 59 schools, out of which 71% were high schools (having classes up to 10th class) and the rest 29% were middle schools (having classes up to 8th class).

The perceptual abilities as mentioned earlier were studied in four major area – visual auditory, kinesthetic and tactile. The level of these perceptual abilities was measured in terms of the total scores obtained by the children in a particular area. These total scores were then converted into percentile scores. Later, on the basis of the calculated percentile scores (calculated separately for the four areas) those scoring between 30th and 60th percentile were considered as moderate or average and those scoring above the 60th percentile were considered to have high perceptual ability.

With regard to the visual perception it was found that majority (37.5% of the students had good visual perception. Followed by them were 35% students who had average and the remaining had poor visual perception. In the area of auditory perception higher number of students were average (38.5%) while the remaining (35%) and (26.5%) had high and poor auditory perception respectively. Similarly, in the kinesthetic perception most of the students were found to score average (38.5%) and high (36.5%) in the area. On the other hand in the fourth perceptual ability that is, tactile perception majority (72%) scored high. This shows that a significant number of the sample children faced difficulty in the first three perceptual areas.

The correlation of the different perceptual abilities was computed with the three academic areas. Reading, spelling and mathematics scores were obtained separately for all the children. The scores in all these areas were clubbed together to form the index of children's academic performance.

The mean value stood at 34.78 with a standard Deviation (SD) of 6.86. When analysed separately it was found that the mean value was highest for mathematics followed by that for reading and spellings. The mean value for the reading performance was 10.54 with SD of 3.05, while the mean for spellings stood at 9.20 with a SD of 2.86. It was found that the children usually had almost similar scores in both reading and spelling. Those children's who faced difficulties in reading also had problem in their spelling. Even the calculation of the correlation between three academic areas proves this finding as the value of correlation between reading and spelling ($r = 0.85, p < 0.001$) was found to be highly significant. Most of the children on the other hand, performed satisfactorily on the mathematical tasks. The mean value for this academic area was as high as 15.05 with a SD of 2.53. Mathematics scores were also significantly correlated with the reading ($r = 0.272, p < 0.01$) and spelling ($r = 0.269, p < 0.01$). These results reveals that the different academic areas are correlated with one another, though reading and spelling are more closely related.

Table 2: Correlation between academics and perception

Variables	Reading	Spelling	Mathematics
Reading			
Spelling	0.856***		
Mathematics	0.272**	0.269**	
Visual Per	0.541***	0.529***	0.157*
Auditory	0.385**	0.426***	0.528***
Kinesthetic Per	0.165*	0.207*	0.068
Tactile Per	0.016	0.056	0.069

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

The next set of results indicates the relationship between the perceptual abilities and the academic performance of the children. When considered on the whole, the academic performance of the children (aggregate of all the three academic areas) was significantly correlated with three perceptual channels namely, visual ($r = 0.521, p < 0.001$), auditory ($r = 0.544, p < 0.001$) and kinesthetic perception ($r = 0.186, p < 0.05$). These

Table 1: Level of perceptual abilities.

Level	Visual perception		Auditory perception		Kinesthetic perception		Tackle perception	
	N	%	N	%	N	%	N	%
Low	55	27.5	53	26.5	50	25.0	19	9.5
Average	70	35.0	77	38.5	77	38.5	37	18.5
High	75	37.5	70	35.0	73	36.5	144	72.0

results show the importance of perceptual abilities and the academic outcomes of the children.

Later, the different academic areas were individually correlated with the perceptual channels. Reading performance was found to share significant correlations with visual ($r = 0.541$, $p < 0.001$), auditory perception (0.385 , $p < 0.01$) and kinesthetic perception ($r = 0.165$, $p < 0.05$). Similar results were found for the spelling performance as also here it was more significantly correlated with visual ($r = 0.529$, $p < 0.001$), followed by auditory ($r = 0.426$, $p < 0.001$) and kinesthetic channels ($r = 0.207$, $p < 0.05$). This reveals that the better the child is in these perceptual areas, the better is their reading and spellings, performance and vice versa.

On the other hand, mathematic performance of the children was found to be significantly correlated with only visual ($r = 0.157$, $p < 0.05$) and auditory perception ($r = 0.528$, $p < 0.001$). This means that this academic areas was more dependent on auditory followed by visual perceptual abilities. The other two channels that is kinesthetic and tactile failed to have any significant influence on the mathematical abilities.

Thus, the results indicate that for the academic performance the perceptual abilities play a crucial role. For reading and spelling performance same perceptual channels played significant role, while for mathematic only visual and auditory are noteworthy.

DISCUSSION

The preset study focuses on the relationship that exists between the perceptual abilities and the academic performance school going children. The results reveal that a significant percentage of the sample academic under-achievers scored low in the three perceptual channels – visual, auditory and kinesthetic. On an average one fourth of the children were poor in these perceptual areas. Tactile perception was the only area where only a few children faced problems.

The results further reveal that the academic performance of the children was significantly correlated with the different academic areas. The present set of results highlight especially the role of three perceptual channels – visual, auditory and kinesthetic. The studies conducted by Miller (1993), Nourbakhsh (2006) support the results as they also reported the importance of different perceptual ability in the learning process. The

findings of Kulp et al. (2004) reveal that children achieve significantly higher when instructions match rather than mismatch their perceptual preferences. However, the finding that tactile perception is not significantly correlated with any academic area does not find support from these already cited researches.

Reading and spelling performances were found to be strongly associated with one another and were significantly correlated with the same perceptual channels. Verma (2001) while comparing children with regard to their academic performance also found the most underachievers have more problems related to auditory discriminations, visual discriminations, figure ground discriminations and perceptual scores. Mathematical abilities were found to depend significantly on auditory and visual perception. Haskell (2000) also while delineating the factors responsible for the arithmetic difficulties in young children noted that they might be caused by disorders in perceptual abilities. Sortor et al. (2003) and Rourke (2005) have especially focused on the role of visual perception in mathematics and reading performance of children at school.

The implications of this study are that there should be acceptance and awareness of perceptual abilities and their role in the learning process and hence academics. The findings are especially useful for enhancing the teaching- learning process. It divulges that the academic performance is exceedingly correlated with the perceptual abilities as such the latter play a momentous role in shaping the classroom achievement of the children. In light of these findings it is suggested that there should be a more individual accommodations for each students based upon a more thorough diagnostic and prescription for each students. For example, when new words are being taught, students whose perceptual strength is auditory should first hear the word, then have such features as shape, visual dimensions and size introduced. Those with visual strengths should see the word first then examine the shape and size dimensions and then use it. Children with tactual strengths should write the words after its introduction, then use it. The kinesthetic children may need to experience the word in a real situations, and then use it. Learning based on perceptual channels should start in early childhood years so that children become knowledgeable in using their perceptual preferences. Commitment on the part of the principal and superintendent and

district level personnel to incorporating learning based in perceptual abilities into the schools is key to creating effective classroom teachings that accommodate a broad variety of learners. Professionals development is required for teachers as well as parents because they must continue the use of perceptual strategies at home.

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