Pakistan Journal of Psychological Research, 2019, Vol. 34, No. 1, 25-41

https://doi.org/10.33824/PJPR.2019.34.1.2

Role of Different School Systems in Cognitive Abilities & Academic Achievement of Adolescents

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The present study compared cognitive abilities and academic achievement of adolescents studying in three different school systems namely Urdu medium schools, English medium schools, and Cambridge system schools. The sample comprised of 1001 secondary school student. Cognitive abilities were assessed by Raven's Standard Progressive Matrices (1960) and marks obtained by the students in the last annual examination were used as an index of academic achievement. Results showed that cognitive abilities of the students were positively associated with academic achievement of the respondents. It was further found that cognitive abilities and academic achievement of students studying in Cambridge school system was better as compared to those studying in other systems. Post-hoc comparison revealed that level of academic achievement of Urdu medium schools was lower as compared to English medium and Cambridge system of schools. The findings suggest that difference in schooling system influenced cognitive abilities and academic achievement of the students. Results further demonstrated that gender was a significant predictor of academic achievement in both Urdu and English medium schools. Future implications of the study were also discussed.

Keywords. Cognitive abilities, adolescents, academic achievement, school systems

Academic success at school plays an important role in future academic career of young persons. Cognitive abilities have been identified as being closely associated with academic performance (Chamorro-Premuzic & Furnham, 2005; Rindermann, & Neubauer, 2001). One of the main objectives of development of intelligence tests was to assess the level of cognitive abilities to predict academic

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success and failure (Ackerman & Heggestad, 1997). Cognitive abilities are the mental process of knowing, perceiving, bringing awareness, reasoning, and judging to investigate the mechanisms of learning, remembering, problem-solving, paying attention, logical reasoning, abstract thinking, and new concepts' formation when one is encountered with novice situation. Individual's intellectual growth, independent thought and meta-cognition expands during adolescence (Kellough & Kellough, 2008). Adolescents are keen observers and inquisitive about adults (Scales, 2003), develop increased abilities to plan personal goals and think about the future (Kellough & Kellough, 2008), and are capable of solving problems and reflective thinking (Manning, 2002).

Cognitive ability is of crucial importance in foreseeing the academic outcomes and has lasting effects on later intellectual outcome (Ackerman & Lohman, 2003; Deary, Strand, Smith, & Fernandes, 2007; Sternberg, Grigorenko, & Bundy, 2001). Cognitive abilities develop and improve cognition and learning skills, predicting individual's achievement on a broad range of academic tasks among adolescence i.e. vocabulary, comprehension, problem solving, following directions, and note-taking (West & Woessmann, 1999). The relation between cognitive abilities and academic achievement is reciprocal; thus, cognitive abilities appear to foster and promote school learning.

Schooling has positive impact on the development of cognitive abilities (Carlsson, Dahl, Öckert, & Rooth, 2015), perceptual abilities, memory, use of language and classification (Finn et al., 2014). It is also evident that schooled children not only accomplish various memory tasks but also utilize mnemonic strategies to remember (Kosmidis, Zafiri, & Politimou, 2011). Schooling affects use of language, manipulation of numerical representations, and understanding social relations (Pullman & Allik, 2008). Students learn to think in terms of general categories and in abstract. Moreover, it is schooling that improves the individual's ability to reflect on their cognition and meta-cognition (Ceci & Williams, 1997).

Adolescents' perceptions of schools environment can influence their achievement motivation and academic performance (Bradshaw, Koth, Bevans, Ialongo, & Leaf, 2008). Cognitive abilities positively contribute to academic success (Ciorbea & Pasarica, 2013) and are directly associated with schooling (Finn et al., 2014). Schooling system may also significantly contribute to the development of cognitive abilities; as Hasting and Weinstein (2008) laid stress on the importance of school choice and school quality in cognitive development among secondary school students. According to Hoxby

(2003), school related cognitive differences are substantial and quite visible in students during and after schooling. West and Woessmann (2010) conducted a study on students of three schools systems (Catholic schools, Government independent schools, & Public schools) found that adolescents who studied at Catholic and government independent schools earned significantly higher scores on tests of cognition than their peers in public schools.

The concept and existence of private schools is rooted in the philosophy of universalizing the education. Private provision of schools is a well-established phenomenon not only in Pakistan but also across the continents. During 2007-2008, private sector was fulfilling the educational needs of about 6 million students but it has shown an increase during recent years. According to Annual Statistical Report of Government Schools (2018), private school enrollment has increased from 1.6 million to 2.06 million during the last four years. Literature review shows that a large number of studies have been conducted in exploring the efficiency and effectiveness of private sector schools in comparison of public sector schools in Pakistan. Findings of the studies conducted in the field proved that students of private schools outperform their peers in public schools in various dimensions, like academic achievement, intelligence, classroom discipline, student attendance, and teacher student relationship (Almani, Soomro, & Abro, 2012; Das, Pandey, & Zojonc, 2006; Dronkers & Robert, 2003).

Different school systems are prevalent in Pakistan, which can be broadly divided into following categories: Urdu medium schools, English medium schools, Cambridge system schools, and Madrassah system schools. Urdu medium schools utilize text books for each subject published in Urdu language (Shamim, 2011). These schools follow Urdu as medium of instruction which is the national language of Pakistan. In addition, these schools lack in basic facilities and resources needed for quality delivery of education and has outdated infrastructure. Schools working under this system differ in recreational activities, physical infrastructure, students' rewards and future directions. In addition, there is less focus on the recreational activities and mostly the students are confined to the classroom teaching with traditional teacher-centered approaches. These schools also make investments in teachers' training. However, the trainings are not contributing much to the classroom teaching due to overcrowded classrooms.

The English medium schools are independent schools, owned by non-government and semi government organization. These schools provide quality education at a higher cost and also utilize text books

for each subject published in English language and uses English as medium of instructions. Majority of these schools are managed in recently constructed buildings with all modern infrastructure and facilities required for quality learning. In a nutshell, these schools are equipped with all necessary modern facilities and resources (laboratories, library, & playground) required for effective student learning. In addition, the administration of these schools put special emphasis and invests on teachers' trainings. One of the features of these schools is that they continuously supervise and monitor their teachers' and students' performance since they are in competition with other schools in providing better education (Niazi & Mace, 2006).

Cambridge system schools follows Cambridge curriculum, offered across the world which is designed and prepared by international educationists as per need of modern times and is conceptual and activity based. Almost more than 40 subjects are offered in these institutions and a student can opt for these subjects according to his/her interest. Cambridge school system follows English as medium of instruction and utilizes up-to-date technology and resources. Student enrollment ratio in these schools is low due to expensive tuition fee. One of the striking features of this schooling system is that they are extremely particular about the teacher's selection criterion. Furthermore, the school makes intellectual investment in their teachers on regular intervals and this might be one of the factors that contribute to the quality of teaching.

Private educational institutions especially schools have played an important role in improving literacy rate and quality of education in Pakistan. Private educational institutions are not only catering for the educational needs of urban elite class but also fulfilling the educational demands of the lower class (Alderman, Orazem, & Paterno, (2001). Some studies demonstrate that public schools as compared to private schools are better regarding students' academic achievement and overall school efficiency (Almani et al., 2012). Andrabi, Bau, Das, and Khwaja (2010) revealed that private schools in Pakistan positively affect learning outcomes of the students; while, Niazi and Mace (2006) also arrived at the same conclusion and consented that students of private schools outperform public schools when compared in terms of academic achievement.

Main objective of the present study was to explore the role of Urdu medium schools, English medium schools and Cambridge school systems on cognitive abilities and academic achievement of adolescents. Madrassa schools were not included in the present sample as they not only follow a totally different curriculum (Islamic) but their system of examination also varies from other three schooling

systems (Shamim, 2011). The prevalent concept of education in Pakistan holds that students of public and private schools differ in various perspectives, namely, intellectual abilities, scholastic achievement, personality grooming and job opportunities. The existing different systems of schooling in Pakistan vary in their curriculum, teaching methodologies, quality of teachers' training, infrastructure, facilities for the students and teachers and school environment. These differences in educational systems result in differential perception about various school systems. The current research aims to find out differences in cognitive abilities and academic achievement of students studying under three different systems of education (Urdu medium, English medium, and Cambridge system schools), whereas the earlier studies have compared only public and private school systems.

Hypotheses

1. Cognitive abilities will be positively associated with academic achievement of adolescents.
2. Cognitive abilities and academic achievement of students studying under Cambridge school system will be better as compared to those studying in other school systems.

Method

Sample

The sample consisted of 1001 secondary school students including 570 (56.9%) boys and 431(43.05%) girls selected through convenience sampling technique. The age range of the respondents was 14 to 17 years where the mean age of girls was 14.8 years (*SD* = .85) and the mean age of boys was 15.7 years (*SD* = .97). The researcher used multistage sampling technique in order to select respondents for the present study. In the first stage, through stratified sampling technique the secondary schools of district Peshawar were divided into three main strata, namely, Urdu medium schools, English medium schools, and Cambridge system schools. From each system 400 students were selected; however, during final analysis of results, the researcher found that 199 students did not provide complete answers to questions asked about different series of Ravens' Standard Progressive Matrices (Raven, 1960) used for the assessment of their cognitive abilities. Consequently their answer sheets were discarded, leaving 1001 students comprising sample of the present study (Urdu medium: *n* = 336, including 167 boys & 169 girls, English medium:

n = 331 including 166 boys & 165 girls and Cambridge system: *n* = 334 including 237 boys & 97 girls). In the second stage, using proportionate sampling process, sample was further divided gender wise into two sub-strata that is boys (*n* = 570) and girls (431). In the third stage, senior students of the school 9th (*n* = 555) and 10th (*n* = 446) graders were selected.

Measures

Demographic sheet. A demographic sheet was used to obtain relevant information about participants such as age, gender, class, and system of education.

Raven's Standard Progressive Matrices (RSPM). To measure cognitive ability of the students, Standard Progressive Matrices (Raven, 1960) was used. RSPM characterized as a nonverbal group test typically used in educational settings and most common and popular test administered to groups ranging from 5-year old to the elderly. RSPM regarded as a multiple choice intelligence test designed to measure general intelligence. The test had a total of 60 items presented in 5 sets (A, B, C, D, & E) with 12 items per set. Test items were geometric parallel in form and subject was asked to identify the missing item that completes a pattern and the person taking the test, selects one out of six or eight answers. There was no time limit to complete the test. For normal adolescents in their late teens, reliability coefficient of .82 to .88 was documented (Lynn, Irwing, & Cammock, 2001; Pullmann & Allik, 2008); while, previous research has reported validity coefficient of RSPM with other intelligence tests ranging from .54 to .88. The reliability coefficient of .86 was acquired for RSPM in the present study.

Academic achievement. Academic achievement of the students was assessed through the annual examination results of the students (Mushtaq & Zubair, 2015). Marks of the 8th grade annual result for the students studying in 9th grade and class 9th annual result for the students studying in 10th grade were used to determine academic achievement of the participants. The marks obtained were converted into percentages as the total marks vary across different school systems. Percentages obtained were used in data analysis.

Procedure

To seek permission from authorities concerned, to collect data from various schools, comprising sample of the study was contacted through formal letters and emails. The aims and objectives of the study were explained in the letters. The researcher contacted

principals of 24 schools; however, data could be collected from 17 schools only, as the principals of remaining schools' refused to allow the researcher to collect data due to the unstable law and order situation in the province. For data collection from Urdu medium schools, formal permission was taken from District Education Officers (male & female). For data collection from English medium schools, meetings with school principals were conducted and school authorities were assured that information about students would be kept confidential and used for research purpose only. Data collection from Cambridge system schools was a challenging task for the researcher as limited numbers of schools are offering Cambridge system in the district. Formal permission was taken from the head offices of the schools in Islamabad. Students of each school were tested in group setting, each group comprising 30 students. The researcher briefly explained the purpose of the study to the participants. All the participants were provided a set of instruments comprising demographic sheet and RSPM. It was explained to the respondents that there is no right or wrong answer. They were assured that all the information would be kept confidential and will not be revealed to their school authorities. RSPM was administered on students who were volunteered to participate in the study and they were further assured that the scores would not affect their examination score in anyway.

Results

The results were statistically analyzed using SPSS version 20. Bivariate correlation was used to explore relationship between students' cognitive abilities and academic achievements. One-way analysis of variance was used to determine significant difference among various schools in terms of students' cognitive ability and academic achievement; while, Tukey post-hoc was used for comparison of schools on different variables, that is cognitive ability and academic achievement.

Table 1

Correlations Between Cognitive Abilities and Academic Achievement Among Students of Different School Systems (N = 1001)

Cognitive Abilities	*n*	Academic Achievement	*p*
Urdu Medium	336	.30	.00
English Medium	331	.30	.00
Cambridge System	334	.71	.00

Note. Percentages of marks obtained by students in last annual examination was used as index of academic achievement.

Table 1 shows significant relationship between cognitive abilities and academic achievement of students representing three school systems, demonstrating a strong association between cognitive abilities and academic achievements of students studying under all three school systems hence, hence supporting the proposed H1.

Table 2

One-way ANOVA Across Different School Systems on Cognitive Abilities and Academic Achievement of Adolescents (N = 1001)

Variables	Urdu Medium (*n* = 336)		English Medium (*n* = 331)		Cambridge System (*n* = 334)			
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*
Cognitive Abilities	37.13	8.09	37.81	11.51	45.58	6.194	93.70	.00
Academic Achievement	54.50	14.92	71.46	12.77	71.54	14.02	163.10	.00

According to Table 2, students of Cambridge system are superior in cognitive abilities to students in Urdu and English medium schools. Students of Urdu Medium schools are significantly low in academic achievement than students of English medium and Cambridge system.

Table 3

Post-Hoc Differences in Cognitive Abilities and Academic Achievement of Urdu Medium, English Medium, and Cambridge School Systems (N = 1001)

					95% CI	
Variables	*i*	*j*	*MD(i-j)*	*p*	*LL*	*UL*
Cognitive Abilities	Urdu Medium	English Medium	-.68	.58	-2.69	1.32
		Cambridge System	-8.45	.00	5.77	9.78
	English Medium	Cambridge System	-7.77	.00	6.45	10.46
		Urdu Medium	-6.22	.00	2.34	7.56
Academic Achievement	Urdu Medium	English Medium	-16.95	.00	-19.9	-14.17
		Cambridge System	-17.03	.99	-2.62	2.46
	English Medium	Cambridge System	-0.08	.09	-14.17	2.00
		Urdu Medium	-1.33	.27	-3.01	3.29

An examination of Table 3 shows that academic achievement of English Medium Schools is significantly higher as compared to Urdu Medium Schools. No such differences are found between the two

groups compared in terms of cognitive abilities. Results clearly show that students studying under Cambridge system schools are significantly higher than students of Urdu medium schools in terms of cognitive abilities and academic achievements. A comparison of students representing English medium and Cambridge system reveal that students under Cambridge system are significantly higher than English medium schools' students in terms of cognitive abilities. However, nonsignificant difference is found in the academic achievement of students of both the schools.

Table 4

Multiple Regression Analysis Showing Interactions Between Gender, Type of School, Cognitive Abilities, and Academic Achievement (N = 1001)

Interactions	*B*	*SE*	*β*	*t*	*p*
English Medium Schools X Gender	7.42	1.93	.35	3.83	.00
Cambridge System X Gender	2.52	2.03	.13	1.23	.21
Urdu Medium X Gender	-5.80	1.46	-.27	-3.95	.00
English Medium Schools X Cognitive Abilities	-.20	.10	-.24	-2.03	.04
Cambridge System X Cognitive Abilities	1.09	.13	1.48	8.08	.00
Urdu Medium X Cognitive Abilities	-.07	.10	-.08	-.76	.44

Table 4 shows that in both Urdu and English medium schools gender appear to be a significant predictor of academic achievement. However, in Cambridge system, gender is a non significant predictor of academic achievement. However, in English medium and Cambridge system Schools cognitive abilities seem to be a significant and in Urdu Medium non significant predictor of academic achievement.

Discussion

Cognitive ability is identified a good indicator for influencing academic performance (Conway, Cowan, Bunting, Therriault, & Minkoff, 2002; Fry & Hale, 1996). The second hypothesis of the current study assumed that cognitive abilities of adolescents as measured by Ravens Standard Progressive Matrices would be positively correlated with their academic achievements. For this purpose scores on RSPM (converted into percentiles according to the procedure given in the manual) and percentages earned by students in the last annual examination were correlated. As evident from Table 2 students of Cambridge school system who are higher in cognitive

abilities also have high academic achievement than their peers in Urdu medium and English medium schools. Thus findings of the present study supported the second hypothesis.

The cognitive ability of any student is a reliable indicator to reflect the kind of achiever he or she might be. The students with high cognitive abilities are likely to show higher scores on their school examination and thus could be called as high achievers. The students from the Cambridge system schools have scored higher on RSPM compare to their peers in Urdu and English medium schools. This shows that the general intelligence and academic achievement are positively related with each other (Deary et al., 2006). Thus, the cognitive abilities could be used to predict the academic achievement. This is also supported by Rohde and Thompson (2007) who found positive correlation between cognitive abilities and academic achievement. Cognitive abilities positively contribute to educational attainment (Calvin, Fernandes, Smith, Visscher, & Deary, 2010; Di-Fabio & Busoni, 2007). Findings of our study are analogous to the previous researches that confirms the existence of positive correlation between cognitive abilities and scholastic achievement (Chamorro-Premuzic & Furnham, 2005; Lounsbury, Welsh, Buboltz, & Loveland, 2007). The current study aimed to examine the variations in cognitive abilities and academic achievement of adolescents studying under Urdu medium, English medium and Cambridge system schools. Results of the study revealed that cognitive abilities of Cambridge system schools are higher than their peers in Urdu medium and English medium schools. It is therefore, concluded that the variations in system of school influence cognitive abilities (Carlsson et al., 2015). There are multiple factors that contribute to variations in cognitive development among adolescents in schools. One of the major reasons is the curriculum and the text books used in these schools. The Cambridge system schools as compared to English and Urdu medium schools differ in the number of facilities and educational climate provided in the school that is instructional planning, teaching strategies, use technology, mode of students' assessment and evaluation, condition and availability of laboratories, libraries and other learning resources. All these factors result in the variation in cognitive abilities among adolescents studying under different schooling systems (Lawson, 2000; Lounsbury et al., 2007; Nghiem, Nguyen, Khanam, & Connelly, 2015).

The Cambridge system schools are termed as a schooling system with students achieving higher average scores than English and Urdu Medium schools. This lead us to the conclusion that the students who embark their educational journeys in the schools of higher average

scores develop cognitive abilities faster than those students who attend lower achieving schools (Borghans, Golsteyn, & Zölitz, 2015). The quality of school and the quality of curriculum has significant impact on the cognitive capabilities of the students (Hastings &Weinstein, 2008). The significant impact of these schools and the way they stitch together the cognitive abilities of the students are mostly seen when these students enter their professional careers. Therefore, school related cognitive differences are substantial and apparently visible in students during schooling and has long lasting effects (Hoxby, 2003). In addition to factors mentioned above, intervention and tuition classes attended outside the school boost cognitive skills among students (Bergman et al., 2011; Klingberg, 2010; Rueda, Rothbart, McCandliss, Saccomanno, & Posner, 2005).

Results presented in Table 4 show that gender is a significant predictor of academic achievement in both Urdu medium and English medium schools. The academic achievement of girls in both the school system is significantly better than boys. Girls usually work hard and put efforts in order to attain good grades. Findings of our study are analogous with earlier studies; for example, Farooq, Chaudhry, Shafiq, and Berhanu, (2011) reported that girls generally perform better in all subjects and particularly in English and mathematics. Another study conducted by Tahir, Ghayas, and Adil (2012) on secondary school students of Punjab (Pakistan) revealed that female students are better than male students in terms of their academic achievement and performance approach goals. The current study investigated the significant difference in academic achievement among adolescents studying under Urdu medium, English medium and Cambridge school system. It is concluded that students of Urdu Medium schools remained low achievers in terms of academic achievement as compared to English medium and Cambridge system schools. The school environment of Cambridge, English and Urdu medium varies drastically. The Cambridge system offers a learning system that combines various methods of teaching and learning coupled with a social and democratic school environment. The students are encouraged to participate in all settings of teaching and learning in and outside the classroom. On the other hand, the English medium schools also encourage their students to be more participative and less passive. However, Urdu medium schools contain comparatively less encouragement for the students to be participative. The students are expected to behave in a certain way, which condition their behavior to a particular kind. Thus the Cambridge and English system provides better environment and socialization opportunities to students as compared to Urdu medium schools. The Cambridge and

English schools also have lower students' strength in each class as compared to Urdu. This results in a greater attention to each student by the teacher in Cambridge and English medium and lesser attention to each student by the teacher in Urdu medium. These factors affect the choice of school by the parents. The educated parents, belonging to middle or upper class, mostly prefer either Cambridge system or English medium schools while the uneducated parents with lower socio economic status send their children to Urdu medium schools.

Students' school experience is significantly associated to their school's engagement and plays a powerful role in their academic achievements (Thapa, Cohen, Guffey, & Higgins-D, 2013). Attending a selective school system significantly and positively affects educational outcomes (Tahir et al., 2012). It has been established that students of private schools perform better than their counterparts in public schools, both in rural and urban areas (Chudgar & Quin, 2012). Adolescents need healthy, secure and stimulating environment to learn and grow. Students spend almost half of the day at schools where environment plays a pivotal role in overall development of child. Therefore, the environment of the school is of paramount significance in shaping intellectual abilities of students. Favorable and supportive school environment enriched with learning facilities make students comfortable, concentrated on academic tasks hence; resulted in higher academic achievement (Carlsson et al., 2015), and also exert positive impact on emotional, social and ethical development of the students (Calvin et al., 2010). Socio-economic status and parents' educational background are also reported as strong predictors of scholastic achievement (Farooq et al., 2011). On the whole, present study contributes to the existing literature by suggesting that various factors such as curriculum and text books, use of technology, school environment, socio-economic status and examination system contributes to variation in cognitive abilities and academic achievement of adolescents studying under different schooling system.

Limitations and Suggestions

Data for the present study was collected from four Urdu medium schools, whereas data for English medium and Cambridge system schools were collected from six and eight schools respectively. Limited number of schools in Khyber Pakhtunkhwa offering Cambridge school system, therefore data was collected from 97 girls and 237 boys. The small sample of girls from Cambridge system is one of the limitations of present study. Data for this study was collected from single district therefore can't generalize the results to the wider population. For the assessment of cognitive abilities single

measure Ravens' Standard Progressive Matrices was used which is a performance test of cognitive abilities. For comprehensive assessment of cognitive abilities, it would be better to use a combination of verbal and performance tests of cognitive abilities. Moreover, Department of Elementary and Secondary Education Peshawar should take practical steps to renovate government schools and construct new classroom and laboratories to cater the educational needs of students. The present research suggests some of the features of Cambridge schooling system, that is, curriculum, teaching methodologies, and system of examination that should be introduced in English and Urdu medium schools to develop the cognitive abilities and enhance academic achievements of students.

Implications

The present study has both theoretical and practical implications. From theoretical perspective, present research makes a significant contribution to the existing body of knowledge in research on various school systems. The Cambridge system schools in comparison with other private and public school system were studied for the first time in Khyber Pukhtunkhwa. The present study suggested that Government should develop a uniform education system in the country. The findings of present research provide guidelines for the educationists, and subject experts for necessity of curriculum development according to modern standards. It is recommended that government should monitor and formulate specific policies to create harmony in curriculum design, teachers' qualification and training, infrastructure and other physical resources required for optimal learning of students studying in different school systems.

Conclusion

The present study examined the difference in cognitive abilities and academic achievements of adolescents studying under different schooling systems. Our findings reveal variation among adolescents studying under Urdu medium, English medium and Cambridge system schools. It is concluded that students of Cambridge system are superior in cognitive abilities than students of English and Urdu medium schools. Results prove that students of Urdu medium are significantly low achievers as compared to learners of English medium and Cambridge system schools. Hence, demonstrate a strong association between cognitive abilities and academic achievement of students representing three schooling system.

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Received 6th March, 2018

Revision received 10th February, 2019