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About the Journal

The Journal of Teacher Education and Research (formerly Ram-Eesh Journal of Education) is the official Journal of the Ram-Eesh Institute of Education, which was established in 1999 under the Rama-Eesh Charitable Trust, New Delhi. Its first issue was published in 2004. It is a half-yearly journal. The purpose of this Journal is to foster inter cultural communication among educators and teachers nationwide; encourage transactional collaborative efforts in research and development; and promote critical understanding of teacher education problems in a global perspective. The Journal is designed to reflect balanced representation of authors from different regions of the Country.

The opinion and views expressed in this Journal are those of the authors and do not necessarily reflect the positions of the Editor, Advisory Board and of the Ram-Eesh Institute of Education.

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Editorial

During the past few years there has been structural as well as curricular changes in Teacher education in India which is impacting on the quality of teacher education. We can learn from what is happening in teacher education in other countries. In this issue research studies from Bangladesh, China and Philippines are also included which give a comparative picture of the problems and issues of teacher education in India and other Asian countries.

Shaharior Rahman Razu studied "Factors Affecting Female Participation in Post Secondary Education: A Cross-Sectional Study from Khulna District of Bangladesh". This cross-sectional study is designed and carried out to identify potential factors that affect the women's participation in post-secondary level of education in Bangladesh through an empirical research. A total of 756 respondents from Khulna District of Bangladesh was selected through systematic random sampling and surveyed with semi-structured interview schedules in this study. The bivariate analyses were performed using chi-square test to explore possible associations between educational status and selected covariates while logistic regression was considered to know the marginal effects of independent variables. Both in bivariate and multivariate setup, respondents' age, type of family, parental education, number of siblings, birth order and household income level were found highly significant (p<0.01).

Marchee Tabotabo-Picardal and Jennifer D. Paño studied in Philippines "Facilitating Instruction of Central Dogma of Molecular Biology through Contextualization". It aimed to promote mastery on this least mastered competency. It was administered to Grade 10 up-land students during their regular science lesson. Paired t-test was used to compare the pre-test and post-test results. Prior to the intervention, students had low conceptual understanding and manipulative skills. At the end of the contextualized instruction, respondents expressed a positively moderate level of engagement implying that their attitude, interest, and behaviour towards the lesson were enhanced by the approach. Generally, the approach is highly commendable for science instruction, particularly genetics concepts, because students find the lesson relevant to them through various parameters of contextualized instruction.

Priyanka Malik and Shefali Pandya have conducted their study in Mumbai (Maharashtra) "A Comparative Study of Academic Achievement of Students on the basis of their Perceived School Culture". The sample of the study included 456 students of standard X selected through probability sampling technique. The study adopted the descriptive method of causal-comparative type. The result indicated that there is a significant difference in the academic achievement of the students on the basis of their perceived school culture. Further, it was found that students from schools with a more congenial school culture showed low academic achievement and those from schools with average and poor school culture showed higher academic achievement.

Sunita Kathuria in her study in Delhi "Educational Inclusion of Children with Disabilities: Government Schemes, Policies and its Awareness" shows Persons with Disabilities (PwDs) are the integral part of the society and peoples' attitude, knowledge and awareness that can help our society to move from segregation to Inclusion. The main findings of the study came out is that yet parents of Children with Special Needs(CwSNs) are considered as the 'PARTNERS' in promotion of inclusion in the society but the ground reality is that they themselves are not fully aware about the various schemes related to inclusion. The findings clearly suggests that one of the prime focus and objective for inclusion is need to be shifted to – 'increasing the awareness level of people with disabilities and their parents towards government policies', as they are the main beneficiaries who can actually help in making inclusion successful by availing these assistances. The objective of Inclusion is not only to provide equality but equity.

Anil Kumar shows "Enhancing the Performance of Students in Science and Mathematics with ICT: An Experimental Study" in Delhi. In the present study, investigator administered the pre-test achievement test in Science and Mathematics subjects to 100 students. Experimental group were exposed to use ICT-based technology i.e. multimedia CD having figures, text, explanation related to the content and also with the help of flipped class teaching. Investigator was present to explain the various concepts taken for teaching through the use of computer and CD-ROM. Teaching occurred for 35 minutes of a period for thirty days to complete the content assigned by the subject teacher in both control and experimental groups. Administration of the post-test was conducted after the instructional treatment and delivery of classroom teaching of both the experimental and control groups. It was found that the students taught through ICT have scored excellent in Science and Mathematics after treatment.

Harish Kumar and Shruti Monga show in NOIDA (U.P.) "Correlates of Professional Development of Teachers: An Exploratory Study". They studied the Teaching Competency of Elementary Teachers in relation to their Self-Concept school support provided by their schools. The data was collected from 60 of private and 60 of Government Schools, (MCD) teachers teaching in Delhi. This study exhibits that Females are more competent and skillful, more flexible, adaptive and creative which is found in various studies. Influence of age on teaching skill as individual learns through experiences as age increases knowledge increases. Experience and age both go hand in hand. As age increases competency also enhanced. Male teachers are less competent this may be due to their major involvement in the family. Private school teachers are exposed to apply newly learned knowledge in their classes.

Ho U Kei, Joao Negreiros and Elisa Monteiro in their quasi-experimental research study show 'Using Rasch and Winsteps to promote English Grammar Skills in Secondary School Students of Macao, China". Its purpose was to seek an alternative way to evaluate students' learning by locating their Zone of Proximal Development in order to provide instructional support to meet students' learning needs. This study found students were more motivated and more accountable for their own learning when their needs were addressed directly. The study also shows that the implementation of IRT requires additional and careful planning while differentiation in student support is essential to make learning effective and efficient.

Anurag Sharma has studied on "Academic Stress among D.El.Ed. students of Ghaziabad District (U.P.)". The purpose of the study is to reveal the level of academic stress among D.El.Ed. students. The present study consists of 200 D.El.Ed. Students studying in Government and private teacher training colleges situated in District of Ghaziabad, India. The present study reveals that the male students' academic stress is higher than the female students. The urban students' academic stress is higher than the female students is less than private school students.

Factors Affecting Female Participation in Post-Secondary Education: A Cross-Sectional Study from Khulna District of Bangladesh

Shaharior Rahman Razu

Received: 27-6-2018; Accepted: 15-11-2018

ABSTRACT

Participation of women in higher level of education is essential for the socioeconomic advancement of developing countries. This cross-sectional study makes an attempt to identify potential factors that affect the women's participation in post-secondary level of education in Bangladesh through an empirical research. A total of 756 respondents from Khulna District of Bangladesh was selected through systematic random sampling and surveyed with semi-structured interview schedules in this study. The ordinal dependent variable, educational attainment categorised as below secondary (grade 10 or below) and post-secondary (above grade 10), was measured by the years of schooling received by the respondents. The bivariate analyses were performed using chi-square test to explore possible associations between educational status and selected covariates while logistic regression was considered to know the marginal effects of independent variables. Both in bivariate and multivariate setup, respondents' age, type of family, parental education, number of siblings, birth order and household income level were found highly significant (P < 0.01) factors affecting female participation in post-secondary education' at the end of the sentence.

Keywords: Women and Participation, Post Secondary Education, Factors, Bangladesh

INTRODUCTION

Education plays an important role in the socioeconomic development of a nation (Hussain *et al.*, 2011). Female education, in particular, is regarded as an essential component for human resource development and for enhancing their socioeconomic status in societies across the world (Sarkar *et al.*, 2014). It has been recognised as panacea to sustainable social development nowadays. In fact, girls' education is considered to be a pivotal element of empowering them (Hill and King, 1995). As half of the population in Bangladesh is female, it becomes a priority to provide them with quality education for the advancement of the country.

Bangladesh has a patriarchal social structure and girls are less prioritised in their families while it comes to educational attainment. Women are generally considered valuable as domestic

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workers to be able to fulfil household responsibilities in this country (Hashmi, 2000; Karim, 2006). There is a common belief that women must not go for higher level of education, hence, girls tend to dropout of schools earlier than boys do (Okafor, 2010). Although girls' enrolment rate has been increased at primary level in recent years only a small number of them continue their education up to the tertiary level (BBS, 2015). The dropout of female children from schools is due to a complex interplay of socio-cultural, economic and structural factors (Nekatibeb, 2002). Existing literature suggests that different social norms, values, beliefs, traditions and practices have strong discriminatory elements mitigating against girls' educational persistence and performance (Colclough *et al.*, 2000) and in many areas, dropout from education is extremely experienced by girls (Bandyopadhyay and Subrahmanian, 2008; Hossain, 2010). Patriarchal gender ideology is often considered to be the influential factor for this vulnerable situation (Baden *et al.*, 1994). Factors like reproductive health issues, teenage pregnancy, customary early marriage, heavier domestic and subsistence duties, malnutrition of girls, and their lower resistance to disease push girls out of school (Brock and Cammish, 1997; Sabates *et al.*, 2010a, 2010b).

Early marriage plays a crucial role in deterring females from participating in post-secondary level education (grade 11 or above). Bangladesh has one of the highest rate of child marriage in the world. According to the UNICEF, around 64% of the girls marry before the age of 18 years in Bangladesh (Ferdousi, 2014). The Bangladesh Demographic and Health Survey (BDHS) also supported the fact that the average age for marriage of girls is 16.4 years in Bangladesh (Ame, 2013). Alongside, parental education, distance to schools, poor quality of education, insufficient facilities, overcrowded classrooms, improper language of instruction, teacher absenteeism and girls' school safety are common causes for school dropout (Pufall *et al.*, 2016; Colclough *et al.*, 2000). Besides, the cost of education is increasing day by day; as a result, many students are incapable to afford it. In Bangladesh, a large number of people live under poverty line that also has an influence on girls' educational attainment. Economic insolvency compels many parents to consider girls education as a waste of fund (Sarkar *et al.*, 2014). This means both family size and income are very much related to female education in poor countries.

Though the rate of female participation in post-secondary education is climbing gradually, the pace needs to be accelerated. Women's involvement in continuing education or their interest in pursuing further education is also not without its challenges (Egenti and Omoruyi, 2011). It is seen that women are entering into the ground of education but they face various problems like dropout and discrimination because of which they cannot uplift their position like their male counterpart in the society. Despite a higher dropout rate and less participation of females in post-secondary education, there is limited number of studies that reports about factors associated with it. Besides, neither case-control nor cohort study was done to identify these factors in Khulna district or south-western region of Bangladesh specifically. Thus, the purpose of this

study was to investigate the socio-demographic factors affecting female participation in postsecondary education of Khulna district of Bangladesh for developing implementation and intervention strategies for sustainable women empowerment.

METHODS AND MATERIALS

This study is a cross-sectional research work conducted at ward no. 22, 23 of Khulna Sadar thana, Ward no. 4, 5 of Daulatpur thana (a small administrative unit), and Dumuria and Gutudia union of Dumuria thana under Khulna District of Bangladesh. Survey research design was followed in this study and a total of 756 women aged between 16 and 30 years was interviewed in this process. The sample size was determined with single population proportion formula by considering 50% proportion of women falling into the mentioned age category (to obtain maximum sample size) with 95% confidence interval and design effect of 2. The respondents were selected by using simple random sampling technique (lottery method without replacement) after a census was conducted in the selected villages. Thirty-two respondents either could not be reached or decided not to participate in this study. The response rate for this study was 96%.

A thorough review of relevant literature was done for preparing the interview schedule used in this study. We included a total of 26 items including socio-demographic status of the respondents in the interview schedule and pretested it on 20 respondents before the final data collection. All the data were collected from the month of June to August, 2017 through face-to-face interview by trained interviewers. The data collected were processed and analysed through Statistical Packages for Social Sciences (SPSS) version 20 software. The main ordinal dependent variable, educational attainment measured by the years of schooling was categorised as secondary or below (grade 10 or below) and post-secondary (above grade 10). The bivariate analyses were performed using chi-square test to explore possible associations between educational status and selected covariates and multivariate analyses were performed using logistic regression to know the marginal effects of independent variables. For ethical clearance, we acquired both written and verbal consent from the participants in this study and followed strict standard of protecting their privacy. The participants were informed that participation in this study is voluntary and they have the freedom to terminate themselves from interview process in any time if they wish.

RESULTS

Socio-Demographic Background of the Respondents

Table 1 shows the descriptive statistics of the socio-demographic characteristics of the respondents. More than half, 57.9% to be specific fall under the age group 16-20. Besides, 20.2% are under age group 21-25 and 21.8% of the total respondents are under 26-30 age group. The average age of the respondents, hence, is 20.9 years. Fifty-six per cent of the total

Variables	Categories	Frequency (n=756)	Percentage
Age (years)	16-20	438	57.9
	21-25	153	20.2
	26-30	165	21.8
Education Level	Below Secondary	423	56.0
	Post-Secondary	333	44.0
Family Type	Nuclear	348	46.0
	Extended	408	54.0
Siblings (Number)	Up to 2	471	62.3
	3 and above	285	37.7
Birth Order	Up to 2	600	79.4
	3 and above	156	20.6
Father's Education Level	Illiterate	216	28.6
	Primary (1-5)	147	19.4
	Secondary (6-10)	174	23.0
	Higher (11 and above)	219	29.0
Mother's Education Level	Illiterate (0)	243	32.1
	Primary (1-5)	141	18.7
	Secondary (6-10)	198	26.2
	Higher (11 and above)	174	23.0
Household Income	Lowest Quartile	282	37.3
	Second Quartile	228	30.2
	Third Quartile	87	11.5
	Highest Quartile	159	21.0

respondents have below secondary level of education whereas 44% of the respondents have post-secondary level of education. The average year(s) of schooling was 10.2. Among 756, 348 respondents came from nuclear type family whereas 408 were from extended family. Four hundred and seventy-one respondents have siblings up to two and the rest have siblings not less than three. Almost 80% of the total respondents are either first or the second child of their parents. Twenty-nine per cent respondents reported that their fathers have education up to higher secondary level.

The same percentage (28.6% to be exact) reported their fathers as illiterate. Others have educational attainment ranging from grade 1 to 10. About 32.1% reported that their mothers had no education; 18.7% reported that their mothers had educational attainment up to primary

level whereas 26.2% respondents reported that their mothers had educational attainment up to secondary level. Slightly less than one-fourth (23%) had their mothers with higher level of education that is education up to 11 and 12 grade. Income of 21% respondents' falls under the highest quartile followed by 11.5%, 30.2% and 37.3% for third, second and lowest quartile.

BIVARIATE ANALYSIS

In bivariate setup, results of chi-square test show which factors had a significant effect on educational attainment of the girls. We observed that respondents' age, type of family, parental educational attainment, number of siblings, respondent's position among siblings and household income level were significantly associated with educational attainment.

Variables	Categories	Education	al Attainment		
		Secondary or below (Grade 10 or below)	Post-Secondary (Grade 11 and above)	Chi- square	<i>p</i> -value
Age	16-20	36.3	63.7		
	21-25	68.6	31.4	187.93	.000
	26-30	96.4	3.6		
Family Type	Nuclear (up to 4)	27.6	72.4	210.52	.000
	Extended (5 and above)	80.1	19.9		
Father's	0 (Illiterate)	95.8	4.2		
Education	1-5 (Primary)	91.8	8.2	446.19	.000
	6-10 (Secondary)	36.2	63.8		
	11 and above (Higher)	8.2	91.8		
Mother's	0 (Illiterate)	95.1	4.9		
Education	1-5 (Primary)	70.2	29.8	335.53	.000
	6-10 (Secondary)	37.9	62.1		
	11 and above (Higher)	10.3	89.7		
Siblings	Up to 2	43.9	56.1	73.04	.000
	3 and above	75.8	24.2		
Birth Order	Up to 2	53.0	47.0	10.28	.001
	3 and above	67.3	32.7		
Household	Lowest Quartile	80.9	19.1		
Income	Second Quartile	69.7	30.3	268.08	.000
	Third Quartile	27.6	72.4		
	Highest Quartile	7.5	92.5		

Table 2: Educational Attainment and Its Covariates

REGRESSION ANALYSIS

From the table it is evident that the odds for participation in post-secondary education among the respondents aged between 21 and 25 years were 77% less than the respondents aged between 16 and 20 years. Similarly, respondents who were aged between 26 and 30 years were 99% less likely to get post-secondary education than the reference group. Findings also reveal that members from extended families are 97% less likely to receive post-secondary level of education than those from nuclear family. The result exhibits that females, whose father received no education and whose father received primary education are 99% and 94% less likely respectively to be enrolled in post-secondary level of education compared to those whose fathers' educational attainment was up to the higher secondary level at least. Similarly, females

variable	Categories	AOR*	95% CI	<i>p</i> -value	
			Lower	Upper	
Age	16-20	1	-	-	-
	21-25	0.23	0.08	0.65	0.01
	26-30	0.01	0.00	0.01	0.00
Family type	Nuclear (up to 4 members)	1	-	-	-
	Extended (5 or more members)	0.03	0.01	0.09	0.00
Father's	No education (0)	0.01	0.00	0.02	0.00
education	Primary (I-V)	0.06	0.02	0.22	0.00
	Secondary (VI-X)	0.28	0.10	0.78	0.02
	Higher (XI and above)	1	-	-	-
Mother's	No education (0)	0.04	0.01	0.17	0.00
education	Primary (I-V)	0.07	0.02	0.24	0.00
	Secondary (VI-X)	0.37	0.13	1.05	0.06
	Higher (XI and above)	1	-	-	-
Number of	Up to 2	1	-	-	-
siblings	3 or more	0.29	0.11	0.78	0.01
Birth order	Up to 2	0.29	0.08	1.00	0.05
	3 or above	1	-	-	-
Income index	Lowest quartile	0.05	0.01	0.20	0.00
	Second quartile	0.03	0.01	0.11	0.00
	Third quartile	0.79	0.19	3.24	0.75
	Highest quartile	1	-	-	-

 Table 3: Predictors of Participation of Females in Post-Secondary Level of Education in Khulna

 City of Bangladesh

with mothers having no education and mothers having primary level of education are 96% and 93% less likely respectively in attaining post-secondary education compared to those whose mothers have no less than higher secondary level of education. The table shows that the odds of pursuing post-secondary education is 71% less for females with three or more siblings in comparison to those who have up to two siblings. Birth order is a factor that also contributes to the odds of pursuing post-secondary education for the females. Results show that females who are first and second child of their parents are 71% less likely to receive post-secondary education compared to those who are third, fourth and fifth child of their parents. Findings also reveal that females whose household income falls in the lowest and second quartile are 95% and 97% less likely in pursuing post-secondary education compared to those whose household income falls in the highest quartile.

DISCUSSION

Literature suggests illiteracy of the parents (Suleman *et al.*, 2015), parental income, parental level of education, parental occupation (Kipkulei *et al.*, 2012); poverty and violence (Lenskyj, 2005), social beliefs, malnutrition of girls, geographical factors such as distance of the educational institute from house (Brock and Cammish, 1997), religion, incentives for parents (Oladeji, 2010), gender traditionalism (Bank and Yelon, 2003) as factors influencing female education. Research on this field fundamentally addresses the question that who was excluded from education and why (Nash, 2017). This study attempted to answer the same question from Bangladesh perspective.

The lack of gender equality in higher level of education is a global problem (Sagaria, 2007). Although women's access to higher education has increased worldwide, nevertheless, the promise of equality has not been apprehended out and out (Kelly and Slaughter, 1991). If we look at the history, gender is often ignored completely in textbooks and is often kept as textboxes or short sections portraying women's experience (Jones, 2011). Understanding gender is pretty important because this does not only tell us why women are excluded from pursuing education, rather, at the same time it also shows us what happens even if they are enrolled in higher educational institutes as students or even as academic staff. Heward (1996) found that institutions of higher education are gendered and allegedly privilege men and undervalue women. Even gender plays a key role in determining which subject one is in to pursue higher studies (Lee, 2006; Hopper, 2015). So, implications of gender are manifold when it comes to female education.

Now the question remains: What can be done to increase the participation of women in postsecondary and higher level of education? Literature shows a number of ways out. For example, government has been portrayed as the prime actor to play the key role in increasing the number of female students in higher level of education (Cotterill *et al.*, 2007). Besides, public and educational policy, on the part of the government, plays a crucial part for giving access to women in the post-secondary academy (Aleman and Renn, 2002). Advocacy can play a pivotal role as well. Due to advocacy in recent decades, access to education for girls has significantly increased (Kearney, 2017). Throughout the twentieth century women increasingly turned to higher education as career preparation or to expand their choices (Eisenmann, 2006). Because of continuous effort promulgated by the women movement in 1960, women could have reached even at the top ranks of leadership in higher levels of education in USA (Bower and Wolverton, 2009). In this regard, government along with non-government organisations and civil society organisations should work together.

Improvement of women's agency improves the odds of girls' school participation (Chudgar, 2008). Private organisations should create more employment opportunities for women because income generating activities, on the part of the women, has always been a measure of women empowerment that has immediate effect. Distance learning can be another solution to attract increased number of women in post-secondary education as women have traditionally been under-represented in face-to-face higher education (Prümmer, 2000). Even friendships and networks, be those formal or informal, play crucial role in advancing women's education (Aiston, 2010). Non-governmental organizations and civil society organizations can also play a key role here in terms of creating a wide array of networks of women, especially the rural women. This would incentivise them to send in their girls to pursue post-secondary education. Besides, compulsory education for girls up to post-secondary level at least coupled with monetary incentives, implementing proper legislation regarding withdrawal of girls from education process, discouraging early marriage through strict enforcement of relevant laws, enhancing the security of women through legal process, social mobilisation, ensuring safe teaching and learning environment are also suggested.

CONCLUSION

Education is a powerful weapon that helps individuals to reach to the height one desires. To make it happen for all, adequate provisions of both human and material resources are needed. Both boys and girls should have equal access to these resources. But the achievement in education especially for girls is constrained by miscellaneous factors. These circumstances vary from society to society. This study reveals that for a country like Bangladesh, age, type of family, level of educational attainment for both father and mother, number of siblings, one's position among them and household income level are the factors that affect women's participation in post-secondary education. The authors acknowledge that the present study is a very small-scale research not denying the fact that there can be other factors which affect women's participation in post-secondary education. Due to time and resource constraints, other probable factors could not be incorporated into this investigation. Further research attempts should be taken by the researchers of this field. Policy makers and social support groups should accelerate the wheel of activities to foster female participation in post-secondary and higher level of education.

REFERENCES

- Aiston SJ, 2010. Women, Education and Agency, 1600–2000: An Historical Perspective. In: J Spence, SJ Aiston and MM Meikle (eds.), *Women, Education, and Agency*, 1600–2000 (pp. 1-8). New York, NY: Routledge.
- Aleman AMM and Renn KA (eds.), 2002. *Women in Higher Education: An Encyclopedia*. Santa Barbara, California: ABC-CLIO.
- Ame KR, 2013. Overcoming the Curse of Early Marriage in Bangladesh. *Asian Journal of Wonen's Studies*, Vol. 19, No. 4, pp. 150-163.
- Baden S, Green C, Goetz AM and Guhathakurta M, 1994. *Background Report on Gender Issues in Bangladesh.* Brighton: Institute of Development Studies.
- Bandyopadhyay M and Subrahmanian R, 2008. *Gender Equity in Education: A Review of Trends and Factors*. CREATE Pathways to Access, Research Monograph No. 18, National University of Educational Planning and Administration, NUEPA.
- Bank BJ and Yelon HM, 2003. Contradictions in Women's Education: Traditionalism, Careerism, and Community at a Single-Sex College. New York, NY: Teachers College Press.
- BBS, 2015. *Population and Housing Census 2015*. Bangladesh Bureau of Statistics (BBS), Ministry of Planning, Dhaka.
- Bower BL and Wolverton M, 2009. The Realities of African American Women in Higher Education Leadership. In: *Answering The Call: African American Women in Higher Education Leadership* (pp. 1-6). Sterling, Virginia, VA: Stylus Publishing LLC.
- Brock C and Cammish N, 1997. *Factors Affecting Female Participation in Education in Seven Developing Countries*. Department for International Development, London.
- Chudgar A, 2008. Looking beyond the Household: The Importance of Community-Level Factors in Understanding Underrepresentation of Girls in Indian Education. In: MA Maslak (ed.), *The Structure and Agency of Women's Education* (pp. 201-215). New York, NY: State University of New York Press.
- Colclough C, Rose P and Tembon M, 2000. Gender Inequalities in Primary Schooling: The Roles of Poverty and Adverse Cultural practices. *International Journal of Educational Development*, Vol. 20, No. 1, pp. 5-27.
- Cotterill P, Jackson S and Letherby G, 2007. Introduction: Conceptualizing Challenges and Negotiations for Women in Higher Education. In: *Challenges and Negotiations for Women in Higher Education* (pp. 1-12). Dordrecht: Springer Netherlands.
- Egenti MN and Omoruyi FEO, 2011. Challenges of Women Participation in Continuing Higher Education Programme: Implications for Adult Women Counselling and Education. *Edo Journal* of Counselling, Vol. 4, No. 1-2, pp. 130-143.
- Eisenmann L, 2006. *Higher Education for Women in Postwar America*, 1945–1965. Baltimore, Maryland, MD: The Johns Hopkins University Press.

- Ferdousi N, 2014. Child marriage in Bangladesh: Socio-Legal Analysis. *International Journal of Sociology and Anthropology*, Vol. 6, No. 1, pp. 1-7.
- Hashmi T, 2000. Women and Islam in Bangladesh: Beyond Subjection and Tyranny. London, UK: Palgrave Macmillan.
- Heward C, 1996. Women and Careers in Higher Education: What Is the Problem? In: L Morley and V Walsh (eds.), *Breaking Boundaries: Women in Higher Education* (pp. 9-22). London, UK: Taylor and Francis.
- Hopper G, 2015. Art, Education and Gender: The Shaping of Female Ambition. London, UK: Palgrave Macmillan.
- Hill MA and King E, 1995. Women's Education and Economic Well-Being. *Feminist Economics*, Vol. 1, No. 2, pp. 21-46.
- Hossain A, 2010. *Age in Grade Congruence and Progression in Basic Education in Bangladesh.* CREATE Pathways to Access, Research Monograph, No. 48. Brighton: University of Sussex.
- Hussain A, Salfi NA and Khan TM, 2011. Causes of Students' Dropout at Primary Level in Pakistan: An Empirical Study. *International Journal of Humanities and Social Science*, Vol. 1, No. 12, pp. 143-151.
- Jones RB, 2011. *Postcolonial Representations of Women: Critical Issues for Education*. Dordrecht: Springer Netherlands.
- Karim KMR, 2006. Gendered Social Institutions and the Management of Underground Irrigation Water Resources in a Bangladeshi Village. *Gender, Technology and Development*, Vol. 10, No.1, pp. 13-36.
- Kearney ML, 2017. Whither Women Graduates in the Knowledge Economy? Observations on the Advancement of Women in Politics, Higher Education and Business. In: H Eggins (ed.), *The Changing Role of Women in Higher Education: Academic and Leadership Issues* (pp. 3-30). Switzerland: Springer International Publishing.
- Kelly GP and Slaughter S (eds.), 1991. *Women's Higher Education in Comparative Perspective*. Dordrecht: Springer Netherlands.
- Kipkulei BC, Chepchieng MC, Chepchieng MJ, and Boitt LM, 2012. Selected Factors Affecting Girls' Participation in Primary School Education in Kenya. *Problems of Education in the 21st Century*, Vol. 48, pp. 52-61.
- Lenskyj HJ, 2005. A Lot to Learn: Girls, Women, and Education in the 20th Century. Toronto: Women's Press.
- Lee J, 2006. Asian American Gender Gap in Science and Technology: Tracking Male versus Female College Students' Paths toward Academic Careers. In: G Li & GH Beckett (eds.), *Strangers of the Academy: Asian Women Scholars in Higher Education* (pp. 37-55). Sterling, Virginia, VA: Stylus Publishing LLC.
- Nash MA, 2017. Thoughts on the History of Women's Education, Theories of Power, and This Volume: An Introduction. In: *Women's Higher Education in the United States: New Historical Perspectives* (pp. 1-21). New York, NY: Palgrave Macmillan.

- Nekatibeb T, 2002. Lower Participation of Female students in Primary Education: A Case Study of Dropouts from the Amhara and Oromia Regional States in Ethiopia. Addis Ababa, Ethiopia: UNESCO International Institute for Capacity Building in Africa.
- Okafor GO, 2010. Socio-Cultural Factors Affecting Girl-Child Education in Maiduguri, Borno State. *Nigerian Journal of Research and Production*, Vol. 17, No. 2, pp. 1-12.
- Oladeji D, 2010. Sociocultural Factors Influencing Girl-Child Education in the Context of Marriage in Ilorin Environs, Nigeria. *Journal of Divorce and Remarriage*, Vol. 51, No. 6, pp. 339-347. doi:10.1080/10502551003652074
- Prümmer CV, 2000. *Women and Distance Education: Challenges and Opportunities*. London, UK: Routledge Falmer.
- Pufall E, Eaton JW, Nyamukapa C, Schur N, Takaruza A, and Gregson S, 2016. The Relationship between Parental Education and Children's Schooling in a Time of Economic Turmoil: The Case of East Zimbabwe, 2001 to 2011. *International Journal of Educational Development*, Vol. 51, pp. 125-134.
- Sabates R, Akyeampong K, Westbrook J and Hunt F, 2010a. *School Drop Out: Patterns, Causes, Changes and Policies*. Background Paper for the UNESCO Global Monitoring Report 2011. Paris: UNESCO.
- Sabates R, Hossain A and Lewin KM, 2010b. School Drop Out in Bangladesh: New Insights from Longitudinal Evidence. CREATE Pathways to Access, Research Monograph, No, 49. Brighton: University of Sussex.
- Sagaria MAD, 2007. Reframing Gender Equality Initiatives as University Adaptation. In: *Women, Universities, and Change: Gender Equality in the European Union and the United States* (pp. 1-6). New York, NY: Palgrave Macmillan.
- Sarkar RK, Hossain E and Reza M, 2014. Socio Cultural Barriers of Girls' Educational Attainment Experiences from Rural Bangladesh. *Antrocom Online Journal of Anthropology*, Vol. 10, No. 2, pp. 349-358.
- Suleman Q, Aslam HD, Habib MB, Yasmeen K, Jalalian M, Akhtar Z and Akhtar B, 2015. Exploring Factors Affecting Girls' Education at Secondary Level: A Case of Karak District, Pakistan. *Journal of Education and Practice*, Vol. 6, No. 19, pp. 95-109.

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Facilitating Instruction of Central Dogma of Molecular Biology through Contextualization

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ABSTRACT

This descriptive research investigated the effectiveness of contextualized instruction of Central Dogma of Molecular Biology, a science concept difficult for students to understand and visualize. It aimed to promote mastery on this least mastered competency. It was administered to Grade 10 up-land students during their regular science lesson. Instruments such as pre/post-test questionnaires, performance indicator checklist of the central dogma of molecular biology processes, and attitude, interest, and behaviour inventory were employed to measure the effect on the three variables: understanding, performance, and engagement, respectively. Paired t-test was used to compare the pre-test and post-test results. Prior to the intervention, students had low conceptual understanding and manipulative skills. At the end of the contextualized instruction, a significant increase was observed. Respondents expressed a positively moderate level of engagement implying that their attitude, interest, and behaviour towards the lesson were enhanced by the approach. Pearson r-correlation was used to establish relationship among the three variables. Understanding and performance correlate with each other but not with engagement. Generally, the approach is highly commendable for science instruction, particularly genetics concepts, because students find the lesson relevant to them through various parameters of contextualized instruction.

Keywords: Central dogma of molecular biology, Contextualization, Science in the Philippines, Science instruction, Teaching genetics, Upland students, Use of driving questions

INTRODUCTION

The status quo of the Philippine education in the field of science showed a downward trend especially in national and international standardized assessments (Cabansag, 2014). The congested curriculum is associated to this depressing scenario as students do not get adequate time on task (DepEd Discussion Paper, 2010). At present, the Department of Education has shifted to K+12 curriculum geared towards inquiry-based learning to improve the performance of students and make them globally competent. Science content and processes are interwoven

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and are arranged progressively with challenging tasks that draw students' interest and desire to learn and appreciate the subject to be relevant, useful, and will facilitate much deeper understanding and retention of concepts (Cabansag, 2014). Despite this goal, secondary school teachers face the burden of covering the large scope of competencies and connecting increasingly abstract concepts like genetics to real scenarios (Alozie *et al.*, 2009) such that the learning competency to explain how the information in the DNA is used in protein synthesis still remains a least mastered skill among students. This is due to the complexity of the concept at the molecular level (Eklund *et al.*, 2007 and Kate Wright *et al.*, 2014).

Appropriate genetic education is essential in school to develop citizens who can understand various issues on applications of genetic technologies (Chattopadhyay, 2005). Understanding the Central Dogma of Molecular Biology at the secondary level is essential and precursor to the higher concepts in biology and other fields of Science (Kate Wright *et al.*, 2014) to be able to connect the process to the activities happening at the level of cells, organs, and organisms (Van mil *et al.*, 2013; Newman *et al.*, 2012). Kate Wright *et al.* (2014) reported that students although they have used the terms such as transcription and translation processes correctly but failed to explain the canonical model of DNA to RNA to protein. This topic on molecular basis of inheritance is cited to be a difficult topic even for the Biology students (Lewis *et al.*, 2000) because the underlying concepts are at the molecular level and it is not available for direct observations (Kozma *et al.*, 2000).

In the literature review of Osborne *et al.* (2003) on the attitudes of students on Science, they have argued that although there are many factors associated on the decline of students choosing to study science, one striking factor is quality teaching. They have insisted that science teaching have to be engaging to the students and provide classroom environment and activities that raise students' interest to science. Education reformists encourage the use of inquiry-based teaching practices that will bridge the gap between concepts and real-life experiences of students. It is theorized to help students find science lessons which are complicated become relevant to their lives through meaningful situations which they can connect (Campbell and Lubben, 2000; Rivet and Krajcik, 2008; Perin, 2011).

There are various innovative approaches to education that are cited to increase conceptual understanding of difficult topics in Science such as role playing (Ross *et al.*, 2008), concept mapping (Novak, 1990), the drawing of visual representations for visual model-based reasoning (Quillin and Thomas, 2015), active learning in a studio classroom (Nogaj, 2013), using computer animation and illustration activities (Marbach-Ad *et al.*, 2008) and videogames (Barab *et al.*, 2009) among many other. The inquiry-based approach comes in many forms such as the project-based learning. These strategies can be integrated in the project-based science learning which is a comprehensive approach designed to engage students to investigate an authentic problems (Blumenfeld *et al.*, 1991; Krajcik *et al.*, 1994; Treacy *et al.*, 2011). This instructional model incorporates contextualization aspect in the classroom instruction. Contextualization of

instruction is encouraged as sound teaching strategy because it emphasizes science content important to the students' lives (National Research Council, 1996; Rivet and Krajcik, 2008; Perin, 2011).

The present study is anchored on the contextualized instruction framework of Rivet and Krajcik (2008), which highlighted the contextualizing instruction as means to facilitate the challenging science concepts more relevant to the students through the use of their prior knowledge and daily experiences (Lewis and Kattman, 2004). They have adapted the project-based science instructional model with the five features namely: (1) presence of driving question, (2) use of anchoring events/experiences, (3) link activities with the driving questions, (4) development of artefacts/projects, and (5) a culminating activity for the unit that support contextualizing instruction.

This study aimed to find out the effectiveness of contextualization of the Central Dogma of Molecular Biology in Grade 10 science instruction in an upland small integrated school because literatures have reiterated the poor understandings of students on this concept (Chattopadhyay, 2005; Cho *et al.*, 1985; Lewis *et al.*, 2000; Lewis and Kattman, 2004; and Tidon and Lewontin, 2004). At this grade level, students are expected to have acquired mastery of topics and skills because of increased retention as they constantly revisited and consolidated it with increasing depth and complexity of learning brought about by spiral progression.

This investigation determined students' understanding and performance (ability to demonstrate the process) and engagement during the contextualized instruction and whether there is a correlation among these variables. Contextualization and localization of materials and instructions are given emphasis in the new curriculum as it is purported to facilitate students' learning (Rivet and Krajcik, 2008). Comments and feedback as experienced by students were gathered to explore the affective aspect on the impact of instruction.

MATERIAL AND METHODS

The study employed descriptive research design. A researcher-made pre-test-post-test questionnaire and performance-checklist indicator were administered to determine the level of understanding and performance by students. The instrument was structured based on Bloom's Taxonomy framework and went through validity procedure from the three experts long been teaching Biology in a university and reliability test of Cronbach's alpha value of 0.75. Initially, students were pre-tested on their understanding and their performance.

To determine students' engagement in the contextualized instruction, an Attitude, Interest, and Behaviour Inventory, which was adopted and modified from Shafer *et al.* (1997) AIE Scale, was utilized. There were three components of engagement, namely, attitude, interest, and behaviour. Each component had a specific rating scale to rate oneself. Five of the statements were stated negatively and the other five were constructed positively. A respondent's score

was the sum of all weighted alternatives towards contextualization. The highest score that a student could obtain was 50 per category and the lowest was 10. High scores would reflect positive response, while low scores would reflect negative response.

The instruction of the lesson was done for two weeks by religiously executing the contextualized daily lesson plans. Intervention was implemented after pre-test and the same instruments were used for post-test. Conduct of assessment using questionnaire was done simultaneously as a class while competency demonstration for replication, transcription, and translation process using paper-cut model to illustrate the processes was performed individually. The comments and feedbacks from the students were gathered after the culminating activity of the lesson.

The entire population of Grade 10 students in an upland integrated school is considered as respondents of this study as they were the first batch of K+12 spiral progression curriculum in Science assumed to have mastered the science skills and concepts from grade 7 to 10 in that school. The research locale is located in a mountainous barangay in Cebu City of Philippines, where majority of the students have no access to facilities such as computer and internet to watch virtual science videos. To consolidate average students' responses level of understanding, performance, and engagement, weighted mean was used. In order to test the hypothesis that there is no significant difference before and after the contextualized instruction, a Paired *t*-test was employed. Pearson Moment correlation was applied to evaluate correlation among the three variables.

RESULTS

Statistical data analysis was done using Minitab Software version 16. Assumptions on the statistical tool to use were confirmed prior to the data analysis. Paired sample *t*-test was used to investigate if there was any significant difference between pre-test and post-test scores for the group (n=36) with respect to their level of understanding and performance. Prior to the instruction, students were administered a diagnostic assessment using the researcher-made pre-test questionnaire. A breakdown of concepts for the science lesson along with the corresponding scores of students was presented in Table 1 and it revealed a poor understanding of the concepts of Central Dogma of Molecular Biology. There was consistency of individual mean value all throughout the subtopics from the replication process to the types of mutation and its effect. The increase of the mean value in the post-test signifies the pronounced effect of the contextualized instruction to the students' level of understanding and performance. The findings were indicated by twice the mean difference (paired t-test; x=12.87; p< 0.05) from the pre-test to the post-test results.

A statistically significant difference ($T_{value}=1.699$ versus $C_{value}=12.53$ and $C_{value}=44.21$, p< - .05) for understanding and performance, respectively, was revealed when the pre-test and post-test mean values for both level of understanding and performance were compared (refer to Table 2). The average mean for both pre-test and post-test in the level of understanding

Concepts	Pre-test Mean	S.D.	Post-test Mean	S.D.	Mean Difference
Replication	15.42	3.78	29.71	2.85	14.29
Transcription	12.87	4.12	24.38	7.54	11.51
Translation	12.38	5.12	23.77	5.83	11.39
Role of DNA and RNA in protein synthesis	14.57	4.65	28.86	3.87	14.29
Types of Mutations and its Results	13.88	4.82	26.75	3.11	12.87
Average					12.87

 Table 1: Pre-test and post-test Mean±S.D. of Students' level of understanding on the Central Dogma of Molecular Biology Concepts

*Level of significance at P<0.05

Table 2: Paired sample t-test for the level of understanding and performance of students

Group	N	Mean	S.D.	t _{computed} -value	T _{value}	P _{value}
Pre-test	36	13.83*	±3.56	12.53*		
		15.56**	±1.69	44.21**	1.699	0.000
Post-test	36	26.69*	±4.70			
		42.17**	±3.66			

* Level of Understanding; ** level of performance (level of significance at P< 0.05)

(paired t-test; $x=13.83\pm3.56 - 26.69\pm4.70$; p< 0.05) emphasized the improvement of the cognitive aspect of learning after the intervention. Manipulative ability was assessed to gauge the level of performance of students in demonstrating the process of protein synthesis. There was a statistically significant difference between pre-test and post-test (paired t-test; $x=15.56\pm1.69-42.17\pm3.66$; p< 0.05) attributed to that aspect of the contextualized instruction.

Another variable looked in to the present study was the level of engagement of students all throughout the duration of the instruction. There were three components of engagement namely: attitude, interest, and behaviour. As shown is Table 3, the mean average (x=36.47) indicated that students had moderately positive engagement with the lesson and the instruction accounting for the value that fall within the range of x=34.00 - 41.99.

These three variables (i.e., understanding, performance, and engagement) were further investigated as to its relationship with each other through Pearson (*r*) moment correlation (refer to Table 4). Performance and understanding were moderately correlated to each other (r=0.40; $P_{value} = 0.02 < 0.05$). This finding suggests that students understanding have bearing to their ability to illustrate their conceptual understanding in the form of manipulative instructional materials. Meanwhile, engagement had negligible correlation (*r*=0.04 and 0.14; $P_{value} = 0.83$ and 0.43 < 0.05) with the understanding and performance, respectively. The small *P*-values strongly

Table 3: Summary of the Students' Engagement during the Contextualized Instruction							
Component	Average Mean	Qualitative Description					
Attitude	36.33	Moderately Positive					
Interest	36.87	Moderately Positive					
Behaviour	36.20	Moderately Positive					
Average Mean	36.47	Moderately Positive					

Legend: Positive (42.00-50.00); Moderately Positive (34.00-41.99) Neutral (26.00-33.99); Moderately Negative (18.00-25.99); Negative (0-17.00)

Table 4: Correlation	on the Students'	Levels of Unde	erstanding, Perf	ormance and Engagement

Variables	Unders	standing	Description	Performance		Description	Engagement		Description
	r	P		r	P		r	P	
Understanding	-	-	-	0.40	0.02	Moderate Correlation	0.04	0.83	Negligible Correlation
Performance	0.40	0.02	Moderate Correlation	-	-	-	0.14	0.43	Negligible Correlation
Engagement	0.04	0.83	Negligible Correlation	0.14	0.43	Negligible Correlation	-	-	-

*Level of significance at P<0.05

defined the rejection of null hypothesis that there was a statistically significant relationship between and among three variables.

DISCUSSION

Students' Understanding of the mechanism of DNA - RNA - PROTEIN

The self-prepared multiple-choice questionnaire centred on the ability of the questions to elicit understanding from students through situations that prompted them to explain, illustrate, interpret, and infer the processes of replication, transmission, and translation. It also required them to summarize and represent the overall process as well as the consequences (i.e., mutation and genetic diseases) and various applications of these processes (i.e., genetic engineering, cloning, DNA fingerprinting, etc.) to the cell, organs, organisms, and society as a whole.

Among the topics of the central dogma of molecular Biology, transcription and translation processes registered lowest. This finding is in consonance with the study of Kate Wright *et al.* (2014) as they confirmed that students have weak conceptual understanding on the arrows and representations of central dogma. Students performed better in the concepts of roles of DNA and RNA in the replication process, and types of mutation. Results connote less prior knowledge and misconceptions of the concepts as they need the prerequisite knowledge on cell division and reproduction to be able to correctly explain the process of gene transmission.

This finding supported the argument of Chattopadhyay (2005) and Lewis *et al.* (2000) that there is a lack of basic knowledge on genetics and genetics technologies by the students and widespread misconceptions at various levels. The significant post-test result implied that they have developed a conceptual understanding of the mechanism of how the information from the DNA to RNA to produce a functional product in the form of proteins.

The increase in scores of students implied that the various features of contextualization approach directly helped improved students' understanding of the lesson as a whole. Hence, contextualized instruction favourably increased the result of the pre-test. The thematic driving question "*Why are we somehow similar but different from each other*?" presented at the beginning of the module motivated them to find the relevance of the lesson to the problem/question. The students' formulation of a concept map and the daily revisit of it have stimulated their minds to connect one lesson to the other, one process to the other processes. Predmore (2004) characterized students in this contextual teaching and learning as highly motivated, have higher retention of information, and perform better in class.

Students were only familiar with very few terms such as DNA, genes, proteins, but they could not clearly explain their roles in living things and even their meanings. This is not surprising as Newman *et al.* (2012) and Lewis and Kattman (2004) reported that there were misconceptions on this topic in Biology despite the familiarity of the terms. Most of the terms were new to them such as replication, transcription, translation, mutation, enzymes, and much more. This misconception is affected by their poor prior knowledge about the topic which is attributed to their low performance. As Lewis (2000) puts it, there were widespread misconceptions and uncertainties on the processes as well as the structures involved in the transfer of genetic information. As a consequence to this, the students cannot answer higher level questions which require analysis, evaluation of situation and suggesting solutions. A possible explanation to this dilemma on conceptual problem is inferred by Flodin (2004) to be not just a question of students' learning because of how they are taught but could also be because of what they are taught. This can be attributed to the variations in the gene concepts in the sub-discipline in the Biology textbook as well as the quality teaching (Ogunmade, 2015; Mupa and Chinooneka, 2015).

The positive observation on students can be credited to the multi-faceted aspect of contextualizing features such that it is thematic in approach through the use of driving question, which elicited essential understanding from the student. The various anchoring event and activities relevant and familiar to them and in their daily life served as their basis to relate to the lesson thereby unlocking the abstract nature of the terms and concept (Rivet and Krajcik, 2008), i.e., replication to that of zipper model, complementary base-pairing to popsicle sticks matching, and watching videos of the different processes which happen at the molecular level. The use of materials that seemed familiar to students to simulate the processes concretized the concepts and enabled

them to understand and perform simulation of the processes. Although the representations did not precisely explain in detail, the mechanism that occurs in the real body because it is at the molecular level, the additional video presentation of the molecular processes further enhanced their understanding. The representations only bridged the gap between the abstract nature of the concept and concrete ideas of students.

Before the intervention, students characterized poor background knowledge on the concepts of the lesson and were only familiar with basic ideas such as *DNA as the blueprint of life*, *DNA and RNA are genetic materials of cell* because it was not thoroughly elaborated to them and had a hard time comprehending about it in their previous grade level due to the complexity of the concept. The intervention required students to cut paper-templates and identify it and create a structure to be able to explain the flow of the process of replication, transcription, and translation and it contributed to the mean gain. It validated Eklund *et al.* (2007) claim that integrating in the unit, the contextualization of content and included familiar events and examples that are engaging and personally relevant to the students. The use of multiple representations and inquiry-based student activities all helped in an increase in the understanding aspects of the more challenging concepts of molecular genetics.

The presentation of driving question "Why are we somehow similar but different from each other?" helped the students focus their understanding and generalizations from the activities as they investigated the answer to the question all throughout the unit. Various anchoring events using locally-available materials and videos supplemented students in visualizing the concepts at the molecular level contributed a lot to the students' grasp of concepts. Inquiry-based activities that frequently linked to the driving question, the development of artefacts/projects through concept map and paper-cut model, and finally the presence of culminating activity through human simulation of molecular genetics processes all facilitated students in the acquisition of knowledge and competencies. They were also instrumental to the retention of ideas because it allows them to get the gist of the entire module at the bird's eye view. This in turn enabled students to explain that all living things contained DNA, which stores the set of instructions on what kind of protein will be synthesized by the cell needed for the structure and function of an organism.

The approach required them to perform challenging tasks of simulating the whole process using their bodies and these activities were perceived to be mentally stimulating and kinesthetically engaging, therefore, it boosted their performance during their post-test. As observed, they were not used to many activities they have to perform because they were used to sit in the class and listen to the teacher discussing the lesson. Contextualization approach among other inquiry-based and student-centred teaching strategies gave a positive effect on the development of science process skills translating to improved score and better problem-solving ability (Cordova and Lepper, 1996; Rivet and Krajcik, 2008; Perin, 2011).

Students' Engagement during the Contextualization of Science Instruction

The students' attitude, interest, and behaviour towards the contextualization approach was moderately positive, implying that the students like the contextualization approach in the Biology instruction and it facilitated them to understand the science concepts and develop the skills and competencies of the lesson.

When students have a positive attitude towards the lesson and delivery of instruction, they exerted more effort and provided quality of work, which leads to a better understanding and performance. Students were hooked on the lesson because they perceived this approach as interesting, more fun, and essential in their understanding of the lesson.

It also promoted cooperative learning because they were working on task by groups and the students preferred this set-up as they find it more interesting and engaging. It can also be that when students were engaged, they behaved positively because they either enjoyed the lesson or understood the lesson, which either way entailed active learning atmosphere. The positive response of the students indicated that contextualization approach may foster ideal behaviour of the students. This finding is supported by Shernoff *et al.* (2003) about student engagement regarding concentration, enjoyment, and interest, which revealed that students' were highly engaged when there was a balance in the challenging task and their skills. Furthermore, if the instruction was familiar and meaningful to the students and the learning environment was under their control then students display active participation both in individual and group work activities.

Students' remarked that the approach of the lesson was not purely on rote memorization of different processes rather according to them it was full of fun and something to look forward for the next day. Furthermore, their science process skills, as well as interpersonal skills, developed because of the various activities during the instruction. This contention from the students is contradictory to the common impression of learners and even some teachers about this topic in Biology as unappreciated (Khodor *et al.*, 2004), highly complicated (Kozma *et al.*, (2000) and Flodin, 2009), and difficult to teach (Newman *et al.*, 2012; Lewis *et al.*, 2000; Kate Wright *et al.*, 2014).

Correlation between Levels of Understanding, Their Performance, and Engagement

Marks (2000) purported that students' engagement in the classroom led to an achievement and contribute to the development of social and cognitive aspects of students; otherwise, lack of engagement can have adverse effect on students' achievement, which can lead to dysfunctional behaviour. It is therefore interesting to determine at the present setting whether or not interest of students have bearing to their conceptual understanding and ability to perform well in class particularly on a Science lesson. It can be deduced from the findings in Table 4 that if students understood the lesson, apparently, they would be able to explain and demonstrate the processes.

As shown in Table 4, the levels of performance and understanding have moderate correlation. however, understanding and performance showed negligible correlation to students' engagement, which implies that attitudes, interest, and behaviour are not entirely dependent on the students' understanding of the concepts and lessons and performance of skills and competencies embedded in the Central dogma of Molecular Biology.

The result suggests that in terms of engagement which has the following components: attitudes, interest, and behaviour, they are not entirely dependent to the students' understanding of the concepts and lessons and performance of skills and/or competencies embedded in the Central dogma of Molecular Biology. The low correlation of the variables can be attributed to several reasons such as: (1) despite the fact that students have enjoyed the activities embedded in the contextualizing features but due to the complexity of lessons itself, the attitude and interest of the students towards the lesson are affected (i.e., he/she has high level of perception of the lesson but score he/she is not that high); (2) the engagement of students have no impact on their high or low performance and understanding; and (3) despite students' impressive performance and understanding, they have varied personal issues which could result to sometimes low class participation, disruptive conduct, or inattentiveness. This means that even if the student is not interested on the lesson but he/she can perform very high in the subject or test or the other way around. It could also be that the student believes that he is already a performer or already understood the lesson so he does not exert much effort in the activities and cooperate much during group work tasks. Performance and understanding are moderately correlated because if a student grasps the lesson, he can demonstrate the skills and perform the process. During group work, one may suggest ideas or perform a task even if he is engrossed and well-versed of the activities and the lesson simply because he just does not feel like it. It could also be that a student is selective of the activities he performed such that he does not like doing concept mapping but he enjoys so much cutting DNA and RNA template and make paper-cut models, molding clay, or moving around during human simulation activity which caused him to be highly engaged, however, during the test, his score and performance is still low.

Comments and Feedbacks on the Features of Contextualization

Students had a positive feedback and comments on contextualization approach as they found it relevant and challenging to them. It helped them understood the lesson very well because of the various hands-on and inquiry-based activities and the use of materials that are more familiar to them which gave multiple representations of the concepts. One student named Liza (not the real name) gave a positive comment (*statement is translated in English*) regarding the use of anchoring events in the lesson after this feature was explained to them stating that:

Liza: "I like the anchoring event activities because it makes me feel interested in Biology. Because of the modelling clay representation and zipper model, I understood already how DNA and RNA work together to make proteins needed for our body." Another student commented that:

Mariel: "The driving question is difficult to answer and we have to constantly go back to it and answer every after the activity but it was helpful to us because it helps us to be focus in the lesson."

On the opposite note, a slow-learner student expressed a negative feeling towards the use of driving question in a sense that it was complicated for her to understand the driving question and it was not necessary to be part of the lesson. Her comment goes this was

Caitlin: "For me, the use of driving question is not necessary because there are already guide questions in the module and it makes the lesson difficult to understand because we have to relate the lesson always to the driving question".

All the respondents approved the use of anchoring events such as watching videos for the processes of replication, transcription, and translation, tracing family pictures, having real twins in the classrooms, zipper-model, paper-cut model, popsicle-model activities were for them very relevant to their understanding of the lesson.

Joseph: "I liked this technique that our teacher used because I understand the lessons more through the contextualization because I appreciate the videos because it gives me more background knowledge about Central Dogma of Molecular Biology, and when my twin classmates and family pictures were used to introduced for our lesson, I found it very relevant to me and it made me interested about the topic."

An average learner Josh gave a positive comment regarding the use of anchoring events in the lesson after this feature was explained to them stating that:

Josh: "I like the anchoring event activities because it makes me feel interested about Biology. Because of the modelling clay representation and zipper model, I understood already how DNA and RNA work together to make proteins needed for our body."

The two teachers were also asked about their observations of the dynamics of students in class since these teachers oftentimes stayed in the classroom as adviser and subject teacher. They have observed that the anchoring events were very challenging and engaging to the students that those who are usually passive turned out to be the ones initiating a lot of effort all throughout the lessons.

The feature in which activities linked to the driving question, students work in group and had to investigate the driving question and its relationship to their task, and there were some students who did not like about it perhaps because of the complexity of the concept that they had a hard time explaining the relationship. Throughout the course, students work in group to develop artefacts, such as concept map, which they have to constantly revisit every after the day's lesson and they have to present at the end of the module. They also have to construct

paper-cut model of the processes. Students found these activities very challenging and engaging and so this feature has a positive impact to them. Liza, when asked, remarked:

Liza: "The entire module was for me very interesting when we did lots of activities like papercut model, concept mapping by group, and the human simulation activities because it was not boring but actually very challenging because we have to work cooperatively within our group to finish the task."

The last feature is the presence of culminating activity which all the students find very funfilled yet mind-stimulating because they had to work in group cooperatively and made sure that they understood the detail of the lesson for them to be able to simulate and explain the overall process so they may be able to answer the driving question thoroughly. Mark echoed the same response with the other students when asked about the impact of culminating activity in the instruction:

Mark: "We have gained more knowledge on this lesson and liked the different activities we did because it tested out teamwork to be helpful to the group. The human simulation was very challenging because we have to role play the entire process from DNA to protein synthesis but it helped us understood the lesson and why it is called the Central Dogma of Molecular Biology."

Furthermore, five students remarked that the human simulation activity and the presentation of concept map by group gave them more knowledge and skills about the lesson, which they thought would never understand and cannot relate to at first.

All the comments and feedbacks by the students can be supported in the study of Rivet and Krajcik (2008) and Eklund *et al.* (2007) positing the positive effects of the contextualization approach to the students' understanding and performance especially in teaching Biology, specifically, modern genetics.

Conclusively, the contextualizing features were perceived by students positively and the approach is fit and appropriate for the topic and level of students. This approach holds a promise for student learning and good news for teachers who plan to utilize contextualization approach in teaching science subject.

Pedagogical Implications

The use of contextualization approach in science instruction in Grade 10 Central Dogma of Molecular Biology was instrumental for students' conceptual understanding. It is also supportive to the development of process and skills such as differentiating structures and describing the function of DNA and RNA, explaining process of replication, transcription, and translation, demonstrating and simulating process of protein synthesis. Moreover, contextualization is even more operational if the five features are integrated into the instruction. It also improved

students' interest, attitudes, and behaviour towards learning the concepts. The findings suggest the integration of contextualization approach in other fields for the improvement of quality education. Contextualization approach is very practical to Science teachers across grade levels considering K-12 curriculum is in spiral progression, in which, level of complexity of topic increases for science learning to become more relevant to students.

This study build on the principle of constructivism since students learn best when students are actively engaged and involved in the learning process rather than merely lecturing and discussing. It is recommended that teachers especially those teaching science must go beyond their comfort zone to become resourceful enough to transform abstract science concept more relatable to the students by connecting lessons to their daily experiences, use of locally-available materials, and the use of driving question for students to constantly revisit as they go through the entire lesson.

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DECLARATION OF INTEREST

The authors hereby declare no conflict of interest in doing this study.

REFERENCES

- Alozie NM, Moje EB and Krajcik JS, 2009. An Analysis of the Supports and Constraints for Scientific Discussion in High School Project-based Science. *Science Education*, Vol. 94, No. 3, pp. 395-427
- Barab SA, Scott BE, Siyahhan SE, Goldstone RE, Ingram-Goble AE, Zuiker SJ and Warren SE, 2009. Transformational Play as a Curricular Scaffold: Using Videogames to Support Science Education. *Journal of Science Education Technology*, Vol. 18, pp. 305–320
- Blumenfeld PC, Soloway E, Marx RW, Krajcik JS, Guzdial M and Palincsar A, 1991. Motivating Project-Based Learning: Sustaining the Doing, *Supporting the Learning, Educational Psychologist*, Vol. 26, No. 3-4, pp. 369-398
- Cabansag M, 2014. Impact Statements on the K-12 Science Program in the Enhanced Basic Education Curriculum in Provincial Schools. *International Refereed Research Journal*. Vol. 5, No. 2, E-ISSN 2229-4686; ISSN, pp. 2231-4172.
- Campbell B and Lubben F, 2000. Learning science through contexts: helping pupils make sense of everyday situations. *International Journal of Science Education*, Vol. 22, No. 3, pp. 239-252.
- Chattopadhyay A, 2005. Understanding of Genetic Information in Higher Secondary Students in Northeast India and the Implications for Genetics Education. *Cell Biology Education*, Vol. 4, pp. 97–104.

- Cordova D and Lepper M, 1996. Intrinsic Motivation and the Process of Learning: Beneficial Effects of Contextualization, Personalization, and Choice. *Journal of Educational Psychology*, Vol. 88, No. 4, pp. 715-730
- Cho H, Kahle J and Nordland F, 1985. An Investigation of High School Biology Textbooks as Sources of Misconceptions and Difficulties in Genetics and Some Suggestions for Teaching Genetics. *Science Education*, Vol. 69, No. 5, pp. 707-719.
- Eklund J, Rogat A, Alozie N and Krajcik J, 2007. Promoting Student Scientific Literacy of Molecular Genetics and Genomics. Paper presented at the annual meeting of the *National Association for Research in Science Teaching*, April, 2007, New Orleans.
- Flodin VS, 2009. The Necessity of Making Visible Concepts with Multiple Meanings in Science Education: The Use of the Gene Concept in a Biology Textbook. *Science and Education*, Vol. 18, pp. 73–94.
- Osborne J, Simon S and Collins S, 2003. Attitudes towards Science: A Review of the Literature and Its Implications. *International Journal of Science Education*, Vol. 25, No. 9, pp. 1049–1079.
- Kate Wright KL, Fisk NJ and Newman DL, 2014. DNA'!RNA: What Do Students Think the Arrow Means? CBE *Life Science Education*, Vol. 13, pp. 338–348.
- Khodor J, Halme DG and Walker GC, 2004. A Hierarchical Biology Concept Framework: A Tool for Course Design. *Cell Biology Education*, Vol. 3, pp. 111–121.
- Kozma R, Chin E, Russell J and Marx N, 2000. The Roles of Representations and Tools in the Chemistry Laboratory and their Implications for Chemistry Learning. *Journal of Learning Science*, Vol. 9, pp. 1-5.
- Krajcik JS, Blumenfeld PC, Marx RW and Soloway E, 1994. A Collaborative Model for Helping Middle Grade Science Teachers Learn Project-based Instruction. *The Elementary School Journal* Vol. 94, No. 5, pp. 483-497.
- Lewis J, 2000. Genes, Chromosomes, Cell division and Inheritance Do Students See Any Relationship? *International Journal of Science Education*, Vol. 22, No. 2, pp. 177–195
- Lewis J, Leach J and Wood-Robinson C, 2000. All in the Genes? Young People's understanding of the Nature of Genes. *Journal of Biology Education*, Vol. 34, pp. 74–79.
- Lewis J and Kattman U, 2004. Traits, Genes, Particles and Information: Re visiting Students' Understanding of Genetics. *International Journal of Science Education*, Vol. 26 No. 2, pp. 195–206.
- Marbach-Ad G, Rotbain Y and Stavy R, 2008. Using Computer Animation and Illustration Activities to Improve High School Students' Achievement in Molecular Genetics. *Journal of Research in Science Teaching*, Vol. 45, No. 3, pp. 273-292.
- Marks HM, 2000. Student Engagement in Instructional Activity: Patterns in the Elementary, Middle, and High School Years. *American Educational Research Journal*, Vol. 37, No. 1, pp. 153-184.
- Mupa P and Chinooneka T, 2015. Factors Contributing to Ineffective Teaching and Learning in Primary Schools: Why are Schools in Decadence? *Journal of Education and Practice*, Vol. 6, No. 19.

- Newman D, Catavero C and Wright L, 2012. Students Fail to Transfer Knowledge of Chromosome Structure to Topics Pertaining to Cell Division. CBE - *Life Sciences Education*, Vol. 11, pp. 425–436.
- Nogaj LA, 2013. Using Active Learning in a Studio Classroom to Teach Molecular Biology. *Journal* of College Science Teaching, Vol. 42, No. 6.
- Novak JD, 1990. Concept Maps and Venn Diagrams: Two Metacognitive Tools to Facilitate Meaningful Learning. *Instructional Science*, Vol. 19, pp. 29 51.
- Ogunmade TO, 2005. The status and quality of secondary science teaching and learning in Lagos State, Nigeria. Thesis. Edith Cowan University. Retrieved from https://ro.ecu.edu.au/theses/86
- Perin 2011. Facilitating Student Learning Through Contextualization: A Review of Evidence. Community College Review, Vol. 39, No.3, pp. 268-295.
- Predmore SR, 2004. Meeting the Challenges of Urban Education. Techniques: *Connecting Education and careers*, Vol. 79, No. 8, pp. 18-23.
- Quillin K and Thomas S 2015. Drawing-to-Learn: A Framework for Using Drawings to Promote Model-Based Reasoning in Biology. CBE–Life Sciences Education, Vol. 14, pp. 1–16.
- Rivet A and Krajcik J, 2008. Contextualizing Instruction: Leveraging Students' Prior Knowledge and Experiences to Foster Understanding of Middle School Science. *Journal of Research in Science Teaching*, Vol. 45, No. 1, pp. 79–100.
- Ross P, Tronson D and Ritchie R, 2008. Increasing Conceptual Understanding of Glycolysis and the Krebs Cycle Using Role-Play. *The American Biology Teacher*, Vol. 70, No. 3, pp. 163–168.
- Shafer MC, Wagner LR and Davis J, 1997. Student Attitude Inventory. (Mathematics in Context) Longitudinal/Cross-Sectional Study. Working Paper #7.
- Shernoff D, Shernoff E, Csikszentmihalyi M and Schneider B, 2003. Student Engagement in High School classrooms from the perspective of flow theory. *School Psychology Quarterly*, Vol. 18, No. 2, pp. 158-176.
- Tidon R and Lewontin R, 2004. Teaching Evolutionary Biology. *Genetics and Molecular Biology*, Vol. 27, No. 1, pp. 124-131.
- Treacy DJ, Sankaran SM, Messer SG, Saly D, Miller R, Isaac IR and Kosinski-Collins MS, 2011. Implementation of a Project-Based Molecular Biology Laboratory Emphasizing Protein Structure Function Relationships in a Large Introductory Biology Laboratory Course. *CBE – Life Sciences Education*, Vol. 10, pp. 18–24.
- Van Mil MHW, Boerwinkel DJ and Waarlo AJ, 2013. Modelling Molecular Mechanisms: A Framework of Scientific Reasoning to Construct Molecular Level Explanations for Cellular Behaviour. *Science and Education*, Vol. 22, pp. 93–118.

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A Comparative Study of Academic Achievement of Students on the basis of their Perceived School Culture

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ABSTRACT

The purpose of the present paper is to study school culture in terms of six dimensions, namely, democratic governance, student leadership, respect and caring, recognition of diversity and catering to it, clear policies and expectation, emphasis on reflective behaviour and its effect on academic achievement of students. The sample of the study included 456 students of standard X selected through probability sampling technique. The study adopted the descriptive method of causal-comparative type. The school culture questionnaire was developed by the researchers. Students' academic achievement is studied in terms of marks obtained by them at the SSC examination conducted by the Maharashtra State Board of Secondary Education. The result indicated that there is a significant difference in the academic achievement of the students on the basis of their perceived school culture. Further, it was found that students from schools with a more congenial school culture showed low academic achievement.

Keywords: Academic achievement, Clear policies, Democratic governance, Recognisation of diversity, Reflective behavior, Respect and caring, School culture, Student leadership

INTRODUCTION

Anthropologists have an old saying: Fish would be the last creatures to discover water, even though water is the most ever-present and influential aspect of a fish's existence (Kluckholn, 1949, as cited in Finnan, 2000). The same might be said of those working within a school's culture. Just as water surrounds fish, shaping their world view and influencing where they swim; culture surrounds and envelopes principals, teachers, students and parents, shaping their perspectives and influencing their beliefs, assumptions, decisions and actions. School culture is expected to influence the ways in which individuals interact in schools. Different schools have different cultures. School culture is a critical ingredient in the establishment of successful school learning environments. The school culture provides the most significant educational foundation for successful student achievement (Cleveland *et al.*, 2008). A school with a wholesome culture knows what it believes and where it is going (Rooney, 2005).

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School culture is extremely powerful and hence is expected to have a profound influence on the academic success for all students. Culture influences every facet of schools (Deal and Peterson, 1994, 1998). In order to establish a climate that is comfortable, friendly and approachable for all, it is crucial that educators look at the culture of the school. This culture can be inadvertently imposed on people. However, some may not embrace these attitudes. Schools can do their part by welcoming and respecting the diversity of all stakeholders. An academically effective school is distinguished by its culture: a structure, process and climate of values and norms that channel the staff and students in the direction of successful teaching and learning (Sapherand King, 1985). Creating schools with a culture of positive relationships have long been a characteristic of success. However, creating a culture that stresses significant relationships will require significant change in many high schools around the country (Hyslop, 2004). Caring school communities let positive relationships build the school culture around diversity and a variety of different perspectives. Students perceive school culture as a shared commodity, rather than an entity owned by the faculty and administration. Cultures are developed every day in the life of the school (Sapherand King, 1985). Studies in administration underscore the important role of educational leaders as culture builders (Deal, 1990, 1994; Levine, 1989; Parish and Aquila, 1996; Pritchard et al., 2005). The role of the school culture is to provide cues for how teachers should behave in relationship to the expectations of the organization based on students' need for belonging in the school. This culture comprises the external and internal factors that have evolved over time in the school, and includes the assumptions, values and norms that develop over time.

RATIONALE OF THE STUDY

Most school plans concentrate on academic achievement goals, decisions about academic focus, deployment of instructional models, teaching techniques and curriculum tools. Most school plans therefore aspire to create academic focus, on academic sense of responsibility, intensity and urgency. Despite the vast literature on school effectiveness, there is little consensus on how these processes intersect and affect outcomes. Defining and measuring these types of school culture variables is important so that the school personnel have considerable control over the school's processes-in sharp contrast to their lack of control over student and community characteristics. Variables related to student perceptions of their learning environment can provide helpful information on the quality of their educational experiences (e.g., academic press, learning opportunities, over all development) and can help to explain why student achievement varies across classrooms and schools. Hence, every school must build a positive, responsive and dynamic culture in order to fulfil their educational purpose and responsibilities and it provide student a respectful mediating experience through which they can understand, examine, affirm, modify or change understanding of world and how they want to engage in it.

The present study has focussed on academic achievement of students as on outcome of schooling and therefore is an indicator of school effectiveness in the present study and is a
dependent variable. School culture is expected to influence the outcomes of schooling. This variable, therefore, was included in the study as an independent variable.

REVIEW OF RELATED LITERATURE

Studies Conducted in India

Rai (2000) conducted a study on role of education and culture practices in creating environment awareness. Objectives of the study are as follows: (i) To assess the impact of education in creating environmental awareness among people; (ii) To analysis the role of culture practices for the conservation of environment; (iii) To find out the environment awareness among different categories of people and (iv) To analyze the role of education for awareness of the environment hazards. Method: A sample comprised of 10 people selected through purposive sampling. A self-made questionnaire was used for collection of data. The collected data were analyzed using chi-square. Findings: (i) Respondents with higher level of education in the formal system possessed greater awareness towards the environment. (ii) In the opinion of the respondents, use of tradition objects like plates and earthen utensils is greatly relevant to protect the environment. (iii) Both male and female respondents were found to be equally aware of environmental issues. (iv) Both rural and urban respondents showed non-significant difference in their concern for environment. Eksath (2011) conducted a study on whether priorities in primary education enable capabilities, enhance equal opportunities and encourages culture diversity. Introduction: Primary education of good quality is necessitous to development, democracy and social inclusion. India has subscribed to the goals of education for all by 2015 and has embarked on immense priorities in education to reach the goals. Goals are often measured in terms of outcomes of literacy or school attendance. The main objective of this thesis was to take one step further and explore whether these priorities in primary education has the potential to enable capabilities, enhance equal opportunities and encourage cultural diversity among the children in India. Pragmatism was the starting point of this study and a mixed methods research strategy was used in order to perceive a comprehensive illustration of the social world. The thesis provided a background on the specific Indian context as well as a theoretical frame work where central concepts were called into question. The empirical material was collected from various sources as major survey and reports from institutions, work by researchers from various fields and the researchers' own understandings noted in reflective writing exercise. The results were accumulated and discussed in themes in relation to the research questions. The most notable conclusion was that quality was remarkably low in many schools with incompetent pedagogic performances and inadequate learning achievements. This fact together with the in-built inequalities in the Indian society which instigates that many children will never get the opportunity to reach their fullest potential. The research feels that the purpose of education should not be to stuff the child's mind with superficial information about different cultures, but a dialogical learning experience, which is far from the reality in most Indian schools. Thapan (2014) research on the influence of popular culture, media and

aggressive marketing of consumer goods all enter the school arena to compete with the more formal aspects of being at school and contribute to the creation of a unique school culture. According to her, it is essential to unpack and unravel the rich and engaged world of student culture as it is constructed in school life. Her research on "Ethnographies of Schooling in Contemporary India" attempts to understand meaning and meaning-making in school processes in India as active aspects of a vibrant school culture. It is reminded that students, in any kind of school, are engaged participants in schooling processes. This also seeks to understand the significant aspect of constructing school worlds. In richly detailed studies of very different schools across India, builds a common argument that each school seeks in its own way to shape students into 'citizens' through discipline and ritual, but students counter by constructing their own peer cultures. This is an essential contribution to the ethnography of education-and the lively student voices make it a delight to read. Perveen (2014) emphasis the importance of students about the information and knowledge about different sub-cultures as well as to develop a positive attitude towards national integration. A country that lives and thrives in its cultural heritage, and culture is a treasure that needed to be preserved, perpetuated and promoted. Therefore, it is important to develop among students a positive attitude towards national integration. The research aimed to ascertain the effectiveness of multicultural education on attitude towards national integration in students of high school. The selected methodology used is experimental one in the research has used Random Stratified Sampling Technique. The sample selected for the study consisted of 200 students, both boys and girls from high school. The study found that there is no significant effect of the treatment on their attitude towards national integration.

Studies Conducted Abroad

Rutter et al. (1979) suggests that cultural aspects may be the guiding principle for effective schools. They argue that it is valuable to think of schools in terms of their characteristics as social organizations. Teachers in schools form social groups with their own rules, values and standards of behaviour, which they denote as the ethos of a school. Ethos reflects the teachers' expectations about children's work and behaviour, the models provided by the teachers' own conduct in school, and the feedback that students receive on what is acceptable performance at school. Expectations and feedback are likely, as Rutter and his colleagues argue, to affect the ways in which students' behaviour and attitudes develop within a school. Processes of this kind operate in individual interactions between a teacher and a student, in lessons, or in the school as a whole. With respect to this latter aspect, Rutter et al. note: "The importance of some kind of school-wide set of values and norms of behaviour was also reflected in our findings that in the more successful schools, teachers reported that their senior colleagues were aware of matters such as staff punctuality and that they checked that policies were being maintained, as in the setting of homework. This was not a matter of intrusive control or supervision but rather a reflection that staff cared about the way the school functioned. It appeared that an efficient system within which teachers worked harmoniously towards agreed

goals was conducive to both good morale and effective teaching."Gaziel (1997) has studied the impact of culture on the effectiveness of secondary schools with disadvantaged students in Israel. His aim was to determine to what extent the culture of effective schools differed from 'average' schools, and what the contribution of each cultural variable was in explaining these differences in performance. His findings indicate that academic emphasis; norms of orderliness, continuous school improvement, teamwork and adaptation to customers' demands were related to the mean scores of students in Mathematics, English and Hebrew over two subsequent years. Furthermore, academic emphasis proved to be the variable that best predicted the differences in effectiveness across schools. Pang's (1998) research into secondary schools in Hong Kong. Pang studied bureaucratic and cultural linkage as well as tight and loose coupling of schools since these represents several approaches to coordinating and directing staff activities. Tight coupling referred to 'coupling' teaching staff using clear goal orientation and communication and consensus among staff. Loose coupling emphasized a professional orientation and teacher autonomy. Further, bureaucratic linkage reflected formal means of coordination, like formality, bureaucratic control and rationality, while cultural linkage referred to informal approaches, like participation and collaboration, collegiality and achievement orientation. Pang's study showed that for the excellent schools in his sample "emphases on cultural linkage and loose coupling were the most consistent strategies tight coupling the next, but emphasis on bureaucratic linkage was quite diverse" (p. 22). He concludes that the first three are strong forces that bind people together within schools, while such an effect was not apparent for bureaucratic linkage. Gruenert (2000) described a collaborative school culture as a learning organization fostering ongoing student and teacher learning. Fostering a collaborative culture begins with identifying the components of a school culture. Artefacts provide concrete examples of the school's culture, such as school and individual student's trophies, published mission and vision statements and the manner administrators, teachers and support personnel greet strangers. Observations and formal interviews provide evidence of espoused organizational values while assumptions are expressed through values and mores. He expressed the importance of school leaders first identifying the current school culture primarily through qualitative research practices, such as surveys and interviews. Administration of a school culture survey, along with observational data, provides a baseline of the school's culture. Next, school leaders astutely create 17 organizational structures and opportunities for collaboration among school administrators, teachers, support staff, students and parents. Finally, school leaders who strive to develop a collaborative school culture reward those teachers who make positive collaborative efforts. Murry-Harvey (2010) conducted a research on the relationship between students' academic achievement, psychological health and well-being at school. For this study, data were collected from both students and teachers about students' social/emotional adjustment and academic achievement and motivation. Data were obtained for 888 students across years 5 to 9 from 58 classes in 21 South Australia schools, about their perceptions of relationships with family, peers and teachers as sources of stress or support at school. Teachers reported on randomly selected students in each of their classes regarding their Academic Achievement

and Motivation, and their social/emotional adjustment to school. This analysis confirmed the strength of the connection between the student's social/emotional and academic experience of school, and highlighted that both academic and social/emotional outcomes are unambiguously influenced by the quality of the relationships between teachers and students which, when compared with that of family and peers, exert the strongest influence, on well-being and achievement outcomes for students. Sullivan (2010) in his doctoral research found that school culture did influence Teachers' Attitudes towards the Professional Development Plan (TAPDP). His findings showed that, statistically, teachers' attitudes towards TAPDP correlated positively with the five factors of school culture: Collaborative Leadership, Teacher Collaboration, Professional Development, Unity of Purpose and Collegial Support. However, the correlation was too weak with r values ranging from 0.09 (Collegial Support) to 0.21 (Professional Development) suggesting small effect sizes or weak relationship with TAPDP. Piotrowsky (2016) examined the predictive relationship of school leadership on school culture. Given the demands of standards based on the education reform, the goal of every school is student achievement. The study uses the School Culture Survey developed by Gruenert and Valentine (1998) defining six variables: Collaborative Leadership, Teacher Collaboration, Professional Development, Unity of Purpose, Collegial Support and Learning Partnership. As per the analysis, the leadership does have a statistically significant impact on school culture. A post hoc test was used to determine the relationship between school culture and teacher retention and school culture and student achievement. A positive relationship was found to exist between schools with a Culture of Learning Partnerships and teacher retention and between schools with a Culture of Learning Partnerships and student achievement. Murni et al. (2017) suggested that the direct effects of principal's leadership style on student achievement are minimal and many times is not significant. He investigated the relationship between instructional leadership practices and school culture on school academic achievement among principals in the secondary school. The results indicated that there are significant and positive effects of instructional leadership on school culture. The findings indicated the significant and positive effects of school culture on the school academic achievement. Although the principal instructional leadership was not directly related to school academic achievement, it did have an indirectly positive effect. From the mediation analysis results, it was found that school culture fully mediated the effects of instructional leadership on the school academic achievement. In sum, this study adds to the understanding of the intervening variable within the school that influences school academic achievement. Principals can affect the student academic achievement of their students indirectly using their leadership to develop an organizational culture and which in turn promote school academic achievement. Paynter (2017) has done a qualitative action research project that involved focus groups of key stakeholders at an alternative education high school including: students, teaching staff, classified staff, supervisors, families and collaborative partners. A semi-structured interview guide was used to discover their perceptions of a school culture and climate where students FLOURISH. The word FLOURISH is used in the research to describe the optimal experience of thriving and growing as well as an acronym that contains the elements

that a literature review found to be important for such environments serving the most vulnerable student populations. The research is especially important in light of the recent transformation to educational planning and finance in California called Local Control Funding Formula and its creation of the Local Control Accountability Plans with their mandate for stakeholder input. Both systematic analysis and a constructivist approach were used in coding and memoing to track the presence of existing themes and to capture new ones emerging from the transcripts.

NEED OF THE STUDY

Sociologists recognized the importance of school culture as early as the 1930s, but it was not until the late 1970s that educational researchers began to draw direct links between the quality of a school's climate and its educational outcomes. Harvard researcher Edmonds (1982) often regarded as the father of the "effective schools" movement, included "safe, orderly climate conducive to learning" on his influential list of school level factors associated with higher student achievement. "The school's atmosphere is orderly without being rigid", he observed, "quiet without being oppressive, and generally conducive to the instructional business at hand Social Policy, 9(5), 28-32. (p. 32).

Yet despite its importance, organizational culture is possibly the least discussed element in practical conversations about how to improve student achievement. Perhaps that is because factors such as strong leadership, close monitoring of student progress, a common and coherent curriculum, and teacher collaboration all seem like pieces of the puzzle that educators can directly affect. On the other hand, even the synonyms we use to describe a school's culture – terms such as 'atmosphere' and 'climate' – make it sound more like an environmental condition than an educational one. And much like the weather, school culture seems to exist beyond direct human control. But educators in highly effective schools, especially those that serve large populations of disadvantaged students, do not seem to regard the organizational culture as beyond their control. They talk about it and work on it as if it were a tool they can shape and wield to achieve outcomes they desire. Gaining a deep understanding of what a strong, positive organizational culture looks like and how it works can help educators become more thoughtful about developing one.

Hence, in the present study the researcher is interested to conduct a study of school culture and its relationship with academic achievement of students.

Statement of the Problem: "A Comparative Study of Academic Achievement of Students on the basis of their Perceived School Culture."

OPERATIONAL DEFINITION OF THE TERMS

School Culture: School culture refers to the underlying set of norm, values, beliefs, rituals and traditions that make up the unwritten rules of how a student thinks, feels and acts in a school and encompasses the dimensions of democratic governance, student leadership, respect

and caring, recognition of diversity and catering to it, clear policies and expectation, emphasis on reflective behaviour as perceived by students.

Academic Achievement: It refers to the percentage of the marks obtained by a student in the SSC examination.

OBJECTIVE OF THE STUDY

The investigation was conducted with the specific objective of comparing academic achievement of students as an indicator of school effectiveness on the basis of school culture as perceived by students.

NULL HYPOTHESIS

There is no significant difference in the academic achievement of students on the basis of their perceived school culture.

METHOD

The present study adopted the quantitative approach of research as it deals with numerical data and statistical techniques of data analysis. The present investigation was descriptive in nature as it describes the current status of school culture and academic achievement of students. It has adopted the causal-comparative method as it compares academic achievement of students on the basis of school culture.

PARTICIPANTS

The population of the present study consisted of students studying in standard X in schools affiliated to Maharashtra State Board of Secondary and Higher Secondary Education (MSBSHSE). It included schools of different types of management, i.e., municipal schools, private-aided and private-unaided schools situated in Greater Mumbai and with English as the medium of instruction. A sample is a small proportion of a population selected for observation and analysis. In accordance to the design of the study, the sample consisted of 456 students including males and females from the secondary school in Greater Mumbai and out of which 6 forms were rejected because of incomplete data. The response rate was 98.9 %, which is quite high.

SAMPLING TECHNIQUES

In order to select the sample of the study, the researcher has adopted a four-stage sampling procedure. At the first stage, English medium schools affiliated to the MSBSHSE and situated in Greater Mumbai were selected using stratified random sampling where the strata include geographical location of the schools, namely, South Mumbai, North Mumbai and Central Mumbai. At the second stage, schools were selected using stratified sampling where the strata include the type of management of schools, namely, municipal, private-aided and private-

unaided schools. At the third stage, individual classrooms from the selected schools were selected using simple random sampling (lottery method) technique. At the fourth stage, individual students were selected from the classroom using cluster sampling technique. The participants responded and returned the questionnaire to the researchers immediately. This guaranteed maximum retrieval.

INSTRUMENT

For the purpose of the present study, the researcher has made use of the School Culture Questionnaire (Malik, 2015). The school culture tool is prepared by the researchers. Its internal consistency reliability was ascertained using the spilt-half method and was found to be 0.73 and its test–retest reliability was found to be 0.78. Its scoring was done using four-point rating scale (1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree). The scoring was done in such a way that higher the score, better was the school culture and lower the score, poorer was the school culture.

DATA ANALYSIS

Null Hypothesis

There is no significant difference in the academic achievement of students on the basis of their perceived school culture. In this hypothesis, Academic Achievement Score is denoted by AAS and School Culture Score is denoted by SCS.

This hypothesis was tested using one-way analysis of variance (ANOVA), in which the two independent (unrelated) groups using the F-distribution. The following Table 1 shows the relevant statistics of academic achievement of students with the school culture.

	Low SCS	Average SCS	High SCS	Total
N	115	219	117	451
Mean AAS	61.4435	64.3014	54.4103	61.0067

Table 1: Relevant statistics for ANOVA

The following table shows the ANOVA for academic score of SSC students with different levels of perceived school culture.

Table 2: ANOVA for AAS

urce	df	MS	F	Р	
nong groups 74	8 2	3745.09			
or 15	5.8 448	345.997	10.82	< 0.0001	
tal 162	.98 450)			
tal 162	.98 450)			

The F-ratio is significant since P < 0.0001. Thus, the null hypothesis is rejected. Hence, there is a significant difference in the academic achievement of students on the basis of perceived school culture. Since the F-ratio is significant, the *t*-test is used to identify the differences in AAS by levels of school culture.

Groups	N	Mean	df	<i>t</i> -ratio	LoS
Low TSC	115	61.44	332	1.5711	NS
Average TSC	219	64.31			
Low TSC	115	61.44	230	3.739	0.01
High TSC	117	54.41			
Average TSC	219	64.31	334	6.9655	0.01
High TSC	117	54.41			

Table 3: Mean differences in AAS by TSC

*TSC means Total School Culture



Figure 1: Mean academic achievement score on total school culture

CONCLUSION

There is a significant difference in the academic achievement of students on the basis of their perceived school culture. Students from schools with low and average school culture are found to have a higher academic achievement scores as compared to students from schools with high school culture.

The Figure 1 shows the differences in the Mean Academic Achievement Scores of students on the basis of their School Culture.

DISCUSSION

The possible cause for the low academic achievement in a schools with more congenial school culture in the present study is possibly due to the reason that in these schools, students belong to families with high socio-economic status and thus are less pressurized or motivated to score high by their families as they already belong to established family background with secure futures, whereas students with less or non-congenial and average school culture face more pressure from their families to perform better and establish themselves and hence shows high academic achievement.

The findings of the present study are partially corroborated by some prior studies conducted in the western context in which culture was identified as a school improvement strategy. School culture has been shown to be a major component of success at the school, teacher and student level (Creemers and Kyriakides, 2010; Yahaya *et al.*, 2010). The findings of a study by MacNeil (2009) was in contrast to the study at hand in that concluded that strong school cultures have better motivated teachers leading to better student-outcomes.

In conclusion, it may be said that students are an important part in educational administration, but they need guidance to anchor their work. Although, school administrators and teachers holds great importance for students to achieve high standards in order to make to flourish. A strong and healthy school culture can help students to enhance their understanding and learning abilities. A positive school culture leads to development of overall personality of the students.

IMPLICATIONS OF THE STUDY

Peterson (2002a) contended that school culture was an important variable when considering standard-based reform efforts. With an increased focus on higher curriculum standards and accountability, school administrators must consider all variables when attempting to increase student achievement. According to Blase and Blase (2001a), collaboration among faculty was one of the best means for instructional improvement. Studies have indicated that school cultures vary considerably from one site to the next (Bolmanand Deal, 1992). However, there have not been many studies available which determine the relationships between school culture, as defined by democratic governance, student leadership, respect and caring, recognition of diversity, clear policies and emphasis on reflective behaviour. The present study was conducted to determine if such a relationship exists. Overall, the findings provide glimpses on how cultural processes within schools may contribute to student-outcomes.

REFERENCES

Allaire Y and Firsirotu ME, 1984. Theories of Organizational Culture. *Organizational Studies*, Vol. 5, No. 3, pp. 193-226.

- Barr R and Dreeban R, 1983. How schools work. Chicago: University of Chicago Press. Vo. 5, No. 1, pp. 89-162.
- Bossert S, 1988. School effects. In: Boyan, N. (Ed.) The Handbook of Research on Educational Administration. Longman, New York.
- Cleveland, 2012. School Culture, Equity, and Student Academic Performance in a Rural Appalachian School. *Kentucky Journal of Excellence in College Teaching and Learning*, Vol. 9, Article 4.
- Deal TE and Peterson, 1994. Shaping school culture field book. San Francisco: Jossey-Bass Publishers.
- Deal TE and Peterson, 1998. How leaders influence the culture of schools. *Educational Leadership*, Vol. 56, No. 1, pp. 28-30.
- Eksath M, 2011. Learning Diversity in India: Do Priorities in Primary Education Enable Capabilities, Enhance Equal Opportunities and Encourage Cultural Diversity? PEDM12 20111. Education. Mark
- Finnan C, 2000. Implementing school reform models: Why is it so hard for some schools and easy for others? paper presented at the meeting of the American Educational Research Association, New Orleans. (ERIC Document Reproduction Service No. ED446356).
- Friedkin N and Thomas SL, 1997. Social positions in schooling. *Sociology of Education*, Vol. 70, pp. 239-255.
- Fullan MG, 1991a. The meaning of educational change. In: Fullan MG, The new meaning of educational change. Teachers College Press, New York, pp. 30-46.
- Gaziel HH, 1997. Impact of School Culture on Effectiveness of Secondary Schools with Disadvantaged Students. *Journal of Educational Research*, Vol. 90, No. 5, pp. 310-318.
- Gruenert S, 2017. How School Achievements Interplay with School Culture and Principal Behaviors: A comparative Study of Two Middle Schools. *International Journal of Psycho-Educational Sciences*, Vol. 6, No. 1, pp. 10-22.
- Heck R and Marcoulides G, 1996. School culture and performance: Testing the invariance of an organizational model. *School Effectiveness and School Improvement*, Vol. 7, No. 1, pp. 76-95.
- Heck RH, Larsen TJ and Marcoulides GA, 1990. Instructional Leadership and School Achievement: Validation of a Causal Model. *Educational Administration Quarterly*, Vol. 25, No. 2, pp. 94-125.
- Hyslop R and David C Maré, 2004. Understanding New Zealand s Changing Income Distribution 1983 98: A Semiparametric Analysis. Microeconomics 0402014, University Library of Munich, Germany.
- Joreskog KG and Sorbom D, 1993. LISREL VIII. Chicago, IL: Scientific Software.
- Lee VE and Croninger RG, 1994. The relative importance of home and school in the development of literacy skills for middle-grade students. *American Journal of Education*, Vol. 102, No. 3, pp. 286-329.
- Leithwood K, 1992. The move toward transformational leadership. *Educational Leadership*, Vol. 49, No. 5, pp. 8-12.

- Leithwood K, Jantzi D, Silins H and Dart B, 1993. Using the appraisal of school leaders as an instrument of restructuring. *Peabody Journal of Education*, Vo. 68, No. 2, pp. 85-109.
- MacNeil AJ, Prater DL and Busch S, 2009. The effects of school Culture and climate on student achievement. *International Journal of Leadership in Education*, Vol. 12, No. 1, pp. 73-84, DOI: 10.1080/13603120701576241
- Marcoulides G and Heck R, 1993a. Organizational culture and performance: Proposing and testing a model. *Organization Science*, Vol. 4, No. 2, pp. 209-225.
- Marcoulides G and Heck R, 1993b. Examining administrative leadership behaviour: A comparison of principals and assistant principals. *Journal of Personnel Evaluation in Education*, Vol. 7, No. 1, pp. 81-94.
- Meenakshi, 2014. Ethnographies of Schooling in Contemporary India. SAGE, pp. 380.
- Mortimore P, 1991. School Effectiveness Research: Which way at the Crossroads? *School Effectiveness and School improvement*, Vol. 2, No. 3, pp. 213-229.
- Mortimore P, 1993. School effectiveness and the management of effective learning and teaching. *School Effectiveness and School Improvement*, Vol. 4, No. 4, pp. 290-310.
- Murray-Harvey R, 2010. Relationship influences on students' academic achievement, psychological health and well-being at school. *Educational and Child Psychology*, Vol. 27, pp. 104-115.
- Pang NSK, 1998. Organizational Cultures of Excellent Schools in Hong Kong. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA, 13-17 April 1998.
- Papanastasiou C, 2002. Effects of background and school factors on the mathematics achievement. Educational Research and Evaluation: An international Journal on Theory and Practice, Vol. 8, No. 1, pp. 55-70.
- Parish and Aquila, 1996. TIMSS Technical Report (Vol. 1). Boston College, Chestnut Hill, MA.
- Paynter ML, 2017. Exploring a School Culture and Climate Where Students Can FLOURISH: Using Focus Group Methodology to Capture Key Stakeholder Perceptions About School Culture and Climate in an Alternative Education High School." Dissertations.http://scholarworks. sjsu.edu/etd_dissertations/9
- Perveen S, 2014. Study of the Effectiveness of Multi-Cultural Education on the Attitude towards National Integration of High School Students. i-manager's *Journal on Educational Psychology*, Vol. 8, No. 2, pp. 25-30.
- Piotrowsky MJ, 2016. The Impact of Leadership on School Culture and Student Achievement. All Dissertations. 1623 https://tigerprints.clemson.edu/all_dissertations/1623
- Price CL, 2001. Tracks as emergent structures: A network analysis of student differentiation in a high school. Unpublished doctoral dissertation, University of Hawaii at Manoa.
- Rai, 2000. A Study on Role of and Cultural Practices in Creating Environmental Awareness, Ph.D. Thesis Education p. 315, 4th survey of Educational Research, NCERT, New Delhi.

- Raykof T and Marcoulides G, 2000. A first course in structural equation modeling. Lawrence Erlbaum, Mahwah, NJ.
- Reynolds D and Packer A, 1992. School effectiveness and school improvement in the 1990s. In: Reynolds D and Cuttance P (Eds.) School effectiveness: Research, policy, and practice. Cassell, London.
- Rutter M, Maughan B, Mortimore P, Ouston J and Smith A, 1979. Fifteen Thousand Hours: Secondary Schools and their Effects on Children. Harvard University Press, Cambridge, MA.
- Saphier J, 1985. Educational Leadership, Vol. 42, No. 6, pp. 67-74.
- Sarason S, 1982. The culture of the school and the problem of change (2nd Edition). Boston: Allyn and Bacon. Schein EH (1990). *Organizational Culture. American Psychologist*, Vol. 45, No. 2, pp. 109-119.
- Snyder J and Ebmeier H, 1992. Empirical linkages among principal behaviors and intermediate outcomes: Implications for principal evaluation. *Peabody Journal of Education*, Vol. 68, No. 1, pp. 75-107.
- Sullivan JL, 2010. The influence of school culture, school goals, and teacher collaboration on teachers' attitudes toward their professional development plans. Unpublished doctoral dissertation, George Mason University.
- Thapan, 2014. Ethnographies of Schooling in Contemporary India. New Delhi: Sage. pp. 380.
- Tierney W, 1988. Organizational Culture in Higher Education. *Journal of Higher Education*, Vol. 59, No. 1, pp. 2-21.
- Vislocky KL, 2005. The Relationship Between School Culture And Student Achievement In Middle Schools. *Electronic Theses and Dissertations*. 631. http://stars.library.ucf.edu/etd/631
- Wilson R, 1992. Cyprus and the International Economy. St. Martin's Press, New York, NY.
- Yasin MM, Ramly MA, Akmaliah Z, Pihie L and Basri R, 2017. The Mediating effect of School Culture in the relationship between *Instructional Leadership and School Academic Achievement*, Vol. 3, No. 11, ISSN: 2454-1362, http://www.onlinejournal.in
- Yunus, 2013. School Cultural and Academic Achievement in Secondary Schools of Perak: An Exploratory Outlook, *Malaysian Journal of Research*–MJR. EISSN: 2309-4087 Vol. 1, No. 1, pp. 37-44.

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Educational Inclusion of Children with Disabilities: Government Schemes, Policies and its Awareness

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ABSTRACT

Persons with Disabilities (PwDs) are the integral part of the society. Their rights, entitlements and opportunities as well as services for their specific needs, have to be made available in the same ways as they are made available for populace. It is the attitude, knowledge and awareness that can help our society to move from segregation to Inclusion. As India is the signatory to the 'UN Millennium Development Goals' (2000) with one of the aim being 'Universalization of Primary Education by 2015' (although, Inclusion was not specifically mentioned), various Government policies and schemes have been launched to promote Inclusion and striving to make the objective successful. As the schemes and policies are specifically made for mainstreaming of Children with Disabilities (CwDs) into regular setup, it becomes very important that the target population are made well aware about the schemes so that they can avail maximum benefit and advantage of it. The current paper is trying to gain attention towards the importance of awareness of schemes relating to PwDs and provides an understanding of value of awareness of legislative obligations of Government Departments, legal rights and entitlements of PwDs and various benefits/concessions available to them through the Government sector. Therefore, an attempt has been made 'to study the Government schemes and policies (Central and State) for Inclusion and their awareness among the parents of CwDs'. A sample of 80 parents has been selected from Delhi through non-probability sampling technique. Interview schedule and questionnaire have been used as tools for data collection. The main findings of the study came out is that yet parents of CwDs are considered as the 'PARTNERS' in promotion of Inclusion in the society but the ground reality is that they themselves are not fully aware about the various schemes related to Inclusion. The awareness level of the educated parents is average and of uneducated parents, it is poor. The findings clearly suggest that one of the prime focus and objective for Inclusion is need to be shifted to - 'increasing the awareness level of people with disabilities and their parents towards government policies', as they are the main beneficiaries who can actually help in making Inclusion successful by availing these assistances. The objective of Inclusion is not only to provide equality but also equity (Figure 1).

Keywords: Awareness of parents, Delhi schools, Government schemes and policies on educational inclusion, Inclusive education, Mainstreaming of disabled, Need of social equity

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Figure 1: Difference between Equality and Equity

INTRODUCTION

Inclusive education merely means breaking down all kinds of barriers such as social, cultural, attitudinal with an aim to accept and acknowledge that all children can learn together irrespective of their ability or disability (Jhulka, 2002). To have such Inclusive environment, many steps have been taken at lower and upper level and as a result a decentralized system of education has been adopted to provide equity, equality and justice in education (NCF, 2005). The Education Ministry, too, launched a comprehensive scholarship scheme in 1952 which was actually a rudimentary start of the integrated education initiative by the Government of India (Chadha, 2003). Various Government Policies, Acts and schemes have been rolled out to provide equal opportunities to all the children. Some of them are mentioned below:-

- RCI Act no 34 of 1992 (Rehabilitation Council of India)
- PwD Act 1995 (Persons with Disability Act)
- The National Trust for welfare of Persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disability Act, 1999
- National Policy for Persons with Disability, 2006

Some of schemes are mentioned below:

- ADIP (Assistance to Disabled Persons for purchase/fitting of Aids and Appliance) under Department of Empowerment of PwD.
- Schemes for Rehabilitation, assistance to organizations for disabled, support to Non-Government Organizations(NGOs), Establishment of National Institutes in different disabilities, Composite Regional Centres, support to manufacturing companies like Artificial

Limbs Manufacturing Corporation of India (ALIMCO), establishment of National Handicapped Finance and Development Corporation (Micro Credit System), Schemes for Parents Association, Scheme of National Scholarship for Students with Disabilities, Scheme for Education Allowances, National Awards for the Empowerment of PwDs, Scheme of Community-Based Rehabilitation under Ministry of Social Justice and Empowerment.

• Concession given by Central and State Government for the disabled (Travel, communication, allotment of STD/PCOs, conveyance allowance, Children's educational allowance, Reservation of jobs, Unemployment allowances, Social Security Pension, One-time economic assistance, Hostel facility, Maintenance Allowance, Scholarships, Marriage allowances, schemes for sports.

Other Domestic Laws (Indian Laws) which are inclusive of PwDs are as follows:

- Sarva Shiksha Abhiyan (SSA-2001)
- RTE 2009 (Right to Education)
- IEDSS/Rashtriya Madhyamik Shiksha Abhiyan (RMSA-2009)

In this present study, awareness is the level of understanding about the importance and consequences of an issue in communities and societies. Spreading people awareness about an issue is not the same as making them know about what to do - it is explaining issues and disseminating knowledge to people so that they can make their own decisions. There are two main areas to focus on when spreading the awareness about any issue. Primarily, there is general public awareness, which involves widespread understanding and acknowledgement of the issue on a societal level. Second, there is self-awareness, which occurs when individuals understands how the issue affects them personally. This study focusses on both the areas of awareness, i.e., general public awareness and self awareness.

As per researches, Inclusion is still at an infancy stage in India and a dream for many PwDs. It has been learnt from the past that to bring any kind of social change, one need to concentrate upon the knowledge level among the public about an issue.

REVIEW OF RELATED LITERATURE

Asprey and Nash (2006) researched that despite the difficulties, some encouraging and helpful reports of good practice also emerged from the interviews, indicating that inclusion for young people is not an impossible goal.

Campbell *et al.* (2003) illustrated about the value of combining information-based instruction with structured fieldwork experiences in changing attitudes towards disability and Inclusion. It also demonstrated that raising awareness of one disability may lead to changes in attitudes towards disability in general.

Armstrong *et al.* (2011) recognized the contested nature of inclusive educational policies and practices in diverse national contexts. It is argued that the meaning of Inclusion is significantly framed by different national and international contexts. For this reason, the idea of Inclusion continues to provide an opportunity in education and society, in general, to identify and challenge discrimination and exclusion at an international, national and local level, and dissemination of knowledge of all these policies and practices through all level to general public.

Marjon *et al.* (2016) explored the perception of 109 mainstream primary teachers regarding four dimensions of students' additional support in their study titled "Teachers' perceptions of students' additional support needs: in the eye of the beholder?". It studied whether these teacher-perceived students' needs are affected by teachers' years of experience, level of training, personality traits and self-efficacy beliefs. It was revealed in the study that teachers' perceptions of students' needs were relatively unbiased by their personal and professional characteristics.

NEED AND RATIONALE OF THE STUDY

'PwDs are the important part of any society. Their rights, opportunities, entitlements as well as services for their specific needs, shall be made available in the same ways as they are made available for other persons in our rich social fabric. It is the attitude and knowledge of the people that can help the society to accept PwDs in true sense and would help to move from segregation to Inclusion' (Rehabilitation Council of India & Ministry of Social Justice and Empowerment, Oct 2015).

RCI was constituted in the year 1992, since then, various schemes, acts, policies have been adopted and enforced, but India is still at embryonic stage of Inclusion. Delhi, a metro city and capital of India, have handful of inclusive or model schools. Although many schools have adopted integrated approach but just integration is unjust with Children with Disabilities (CwDs). Mere integration brings lots of challenges and problems in the lives of CwDs like curriculum issue, social dejection, attitudinal barrier, assessment issue, physical barrier etc. Despite of many efforts at international, national, state and local level, there are so many questions which arises every now and then such as:

- (a) Why Inclusion is still at initial level in India?
- (b) Why India's struggle is still 'ON' to change the attitude of a society as a whole towards Inclusion?
- (c) What are the reasons behind the low enrolment, low retention and high dropouts of CwDs in schools?
- (d) Why these schemes, policies and laws are not able to give the desired outputs?

As per the research of Asprey and Nash (2006), it has been proved that one of the main reason behind delayed, relaxed and little success rate of Inclusive Education is low awareness level

and negative attitude of parents, teachers and society towards Governmental help in the form of various schemes, policies and acts on Inclusion. In a layman language, the importance of awareness and attitude can be well understood by the example: 'to promote any product or issue, a good amount of money is spent on advertisement by the companies or institutions for promotion and awareness, so that, people become reactive about it'.

Although the Government of India (GoI) has a strong body of legislation intended to promote Inclusion of people with special need, the gap between creation of policies and their implementation by the GoI must be acknowledged and addressed. Various issues and challenges like implementation of policies, limited resources, attitudes and inadequate cognizance etc. have often confounded the acknowledgement of rights exemplified in the policies and their practical implementation. As it has been observed in recent researches, awareness level on the issue and change of attitude is highly required for the realization of the dream of Inclusion (Bennett and Lueke, 1998). The present study would help in knowing the current level of awareness of parents of CwDs towards governmental schemes, policies and act on Inclusion in India.

Research Questions

- What is the awareness level of parents of CwDs on Government policies and schemes for Inclusion?
- How does the awareness level about the Inclusion policies among the parents differ, if at all, on the basis of literacy of the parents, area to which they belong and type of school where disabled children studies?

Statement of the Problem

'A study of the assessment of awareness levels about Government schemes and Policies for Inclusion among parents of CwDs.'

Objectives

- 1. To know the awareness level about Government schemes and policies on Inclusion among educated and uneducated parents of CwDs studying in government schools.
- 2. To find out the awareness level about Government schemes and policies on Inclusion among the educated and uneducated parents of CwDs studying in Private schools.
- 3. To assess the awareness level about Government schemes and policies on Inclusion among the parents of CwDs based on the area where they live.
- 4. To compare the awareness level among parents of CwDs on the basis of literacy of the parents and school where their children studies and area where they live.

Delimitations

- The study is delimited to parents whose CwDs are studying in Inclusive schools of South West District of Delhi, i.e., Najafgarh Zone.
- The study is not focussing on Government schemes related to any specific disability but looking at the schemes for all the disabilities in general by Delhi State Government and Central Government.

RESEARCH METHODOLOGY

The present study is descriptive in nature with qualitative and quantitative methods employed in data collection and analysis.

Population and Sample of the Study

In the present study, population denotes the parents of CwDs studying in Government and Private schools of Delhi.

Sample: As a sample, 100 parents of CwDs are selected by non-probability sampling technique (purposive sampling) (Figure 2).

Tools Used in the Study

The researcher used the following tools for different categories of parents:-

Sample Design



- (i) Interview schedule: The validity (content and face validity) of the questions of the interview Schedule was established by 5 subject experts.
- (ii) Self made questionnaire: The reliability (by test-retest method) and Validity (by 5 subject experts) of the questionnaire was established by the researcher)

Analysis and Findings of the Study

• The analysis of self-made questionnaire is done through the following norms for determining the level of awareness about Inclusion scheme (Table 1).

Table 1: Scoring table of Questionnaire (tool)

Range of Scores (Out of 20)	Level
14 & above	High level of awareness
8–13	Average level of awareness
Below 7	Low level of awareness

• The analysis of interview is done through content analysis.

Objective 1: To know the awareness level about Government schemes and Policies on Inclusion among educated and uneducated parents of CwDs studying in government schools.

Findings

• It has been found that 60% of educated parents whose CwDs are studying in government schools, have average knowledge about the schemes and policies, 20% are having good knowledge and are actually acting as partners in promotion of schemes. 20% of parents are having just superficial (poor) awareness of existence of such schemes for the education of CwDs (Figure 3).



• It has been found that 40% of uneducated parents of government schools have average knowledge about the schemes and policies, 20% have good knowledge and 40% are having poor and superficial awareness of existence of such schemes for the education of CwDs and are not availing all the facilities provided by the government for Inclusion (Figure 4).



Figure 4: Analysis of questionnaire: Data of Uneducated Parents (CwDs in Govt. Schools)

Objective 2: To find out the awareness level about Government schemes and Policies on Inclusion among the educated and uneducated parents of CwDs studying in Private schools.

Findings

• It has been found that 30% of educated parents of private schools have good awareness about the schemes and policies and are assisted with some organizations like NGOs for the welfare and equity of CwDs. 40% are having average awareness and 30% of the parents have poor awareness about the schemes (Figure 5).



• It is found that 20% of uneducated parents of private schools have average awareness about the schemes and 80% are having poor and superficial awareness of existence of such schemes for the education of CwDs and are not availing all the facilities provided by the government for Inclusion (Figure 6).

Objective 3: To compare the awareness level among parents of CwDs on the basis of literacy of the parents and school where their children studies.



Figure 7: Awareness of Parents on Inclusion policies: Comparison on the basis of literacy and type of school

Findings

The findings are as follows:

- Educated parents are 20% good, 50% average and 30% with poor awareness level, whereas uneducated parents have 10% good, 30% average and 60% poor awareness level.
- On the basis of schools, parents whose children studies in Private Schools have 10% good, 30% average and 60% poor awareness level about the governmental schemes for Inclusion, whereas Government schools have much better performance as compared to Private schools, 20% have good awareness, 50% average and 30% poor awareness level about the schemes (Figure 7).

CONCLUSION

As per the findings, it is concluded that:-

• The parents whose children studying in Government schools are more aware than the parents of children studying in Private schools (rural area of Delhi, Najafgarh).

It has been noticed through the study that the efforts made by the Government to make parents aware (through teacher training and NGO participation) about the schemes are quite appreciable. In spite of high illiteracy rate of parents whose children are studying in government schools, the awareness level is quite good and they are availing, if not all, some of the facilities. But still a long way to go, as the parents of children studying in private schools are not much aware about the schemes and are not even availing them. The aim of government is to make whole society sensitized about the issue and invite them to act as partners and promote inclusion, somewhere this aim is getting defeated because if we compare the awareness level between parents of CwDs studying in Government and Private schools, it is noticed that the parents whose children are studying in government schools are more aware but the kind of information they have is also not of much use to them. The depth of knowledge is still missing. During the interview, the negative attitude of the parents towards governmental support has been found as the plausible reason behind low awareness. As per the parents opinion, the assistance provided in monitory terms is very low and even for other assistances, so much of paper work need to be done, which is very time consuming and difficult for them.

• The educated parents are more aware about the schemes and are actually acting as partners in promotion of Inclusion. Some of the parents are working with one or the other NGO and are extending their services either physically or through resources.

It can be concluded by this that literacy plays an important role in awareness of social issues as it expands the horizon of an individual by making them aware and by developing the ability to accept new things empirically and rationally.

• The findings draw the attention towards the awareness level of the parents staying at rural area of Delhi. It came out that majority of people who have been researched are still either at poor or average level of awareness and only few parents belonging to the categories of educated/uneducated or parents of children studying in Private/Government Schools have good level of awareness. After so many years of efforts that too globally towards having Inclusive society, it was expected that at least 70% of the population should have been reached at the level of good awareness and 30% at average level of awareness about Inclusion in global society. Tremendous and considerable efforts have been done in the field of Inclusion in developed countries and much more need to be done in developing countries like India.

SUGGESTIONS

- 1. To increase awareness, Media can be used in all the forms, i.e., Print Media and Non-Print Media. Awareness articles on Inclusion on regular basis may be printed in newspapers. Movies and documentaries can be made for social awareness on Inclusion. Eminent authors can take this issue for social sensitization. Further, *nukkadnataks* and plays may be effective ways of increasing awareness among the people, especially, to the people who are residing in rural areas.
- 2. Large-scale conferences, seminars on national and international level may be conducted on regular basis to promote and discuss the challenges and possibilities in the area of Inclusion.
- 3. The awareness of the present issue may not be shouldered only on Central Government, it may be taken up in a decentralized manner. All the stakeholders may have autonomy and equal accountability for taking the society towards Inclusion.
- 4. Dedicated website like 'Punarbhava' may be updated on regular basis with no language barrier (availability of website in Hindi language as well).
- 5. Government may start a 'Phoneline' with 72h of deadline of providing the information. A call centre may be setup for providing all sorts of information including grievances.
- 6. Door-to-door campaign as well as data collection and services regarding dissemination of information may be employed as it was employed in the case of eradication of Polio programme effectively in India.
- 7. Disability Digital History Museum/Library may contain digital versions of images, texts and other artefacts related to disability history, which may be gathered from libraries and private collection across the country. The goal is to create a theme-based searchable collection of primary source material that will help to expand knowledge and understanding about the historical experience of people with disabilities.

- 8. 'Community Awareness Kit' comprising of DVD, Policy information booklet, resource centres, Train the Trainer module, Centres for Grievances Redressal etc. may be prepared by RCI.
- 9. Surveillance of efficacy may be planned by some government agency responsible for promotion of Inclusion like RCI.
- 10. Various recent researches may be referred for well-organized planning of Inclusion awareness.
- 11. The major role of schools in promotion of inclusion may be given due importance and required assistance may be provided to the schools.
- 12. 'Sugamya Bharat Abhiyan' awareness programme may be promoted widely through various media as general people and parents of PwDs of rural area are still not aware of the benefits.
- 13. 'Parents Awareness Programme' at village, tehsil and district level may be organized at regular intervals by Block Resource Centres, Cluster Resource Centres and District Resource Centres, especially for the parents of the CwDs so that they may be informed about various government policies and other information and provisions and accessibility about the same.

REFERENCES

- Armstrong D, Armstrong AC and Spandagou I, 2011. Inclusion: by choice or by chance?, *International Journal of Inclusive Education*, Vol. 15, No. 1, pp. 29-39, DOI: 10.1080/13603116.2010.496192
- Asprey A and Nash T, 2006. The importance of awareness and communication for the inclusion of young people with life-limiting and life-threatening conditions in mainstream schools and colleges. *British Journal of Special Education*, Vol. 33, pp. 10–18. DOI:10.1111/j.1467-8578.2006. 00406.
- Bennett T, Lee H and Lueke B, 998. Expectations and Concerns: What mothers and fathers say about Inclusion. *Education and Training in Mental Retardation and Developmental Disabilities*, Vol. 33, No. 2, pp. 108-122.
- Campbell J, Gilmore L and Cuskelly M, 2003. Changing Students Teacher's attitude towards disability and Inclusion. *Journal of Intellectual and Developmental Disability*, Vol. 28, No. 4, pp. 369-379, DOI: 10.1080/13668250310001616407
- Chadha A, 2003. Perspectives in Special Education in India: A Journey from Isolation to Inclusion. *Janshala*, Vol. 6, No. 1, January-March, Joint GOI-UN System Education Programme.
- Government of India, Handbook on Disability Rehabilitation. National Information Centre on Disability Rehabilitation, Ministry of Social Justice and Empowerment: New Delhi.
- Jhulka A, 2002. Inclusion, concept and meaning, paper presented at the National Workshop for Training Master Trainers: Orientation in Inclusive Education, March (New Delhi, NCERT).

- Marjon Bruggink, Sui L Goei and Hans M Koot, 2016. Teachers' perceptions of students' additional support needs: in the eye of the beholder?, *Educational Psychology*, Vol. 36, No. 3, pp. 431-443, DOI: 10.1080/01443410.2014.958436
- National Council of Educational Research and Training. (2005). "*National Curriculum Framework 2005*". New Delhi: NCERT.
- Sarva Shiksha Abhiyan, 2003. Training Module on Inclusive Education. Retrieved from http:// ssa.nic.in/inclusive education/training-module-for-resource-teachers-for-disable-children/2003.

Website References

- 1. http://rehabcouncil.nic.in/
- 2. http://www.ncert.nic.in/
- 3. http://www.disabilityaffairs.gov.in/content/accessible_india.php
- 4. http://shodhganga.inflibnet.ac.in/
- 5. http://www.ccdisabilities.nic.in/page.php?s=&t=yb&p=disab_ind
- 6. http://childlineindia.org.in/children-with-disabilities.htm

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Enhancing the Performance of Students in Science and Mathematics with ICT: An Experimental Study

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ABSTRACT

Aim: The aim of the present study was to see the effect of Information and Communication Technology (ICT)-based teaching and learning on the academic achievement of students in Science and Mathematics subjects. Sample: Two Government Senior Secondary Schools, located in Dilshad Garden, Delhi, were selected in this study and 100 students of class VI participated in the study. These students were divided in equal number of two groups, i.e., 50 in experimental and 50 in control group. In both the groups, there were an equal number of boys and girls. Both the groups of students were taught 40 days each. Method: In the present study, investigator administered the pre-test achievement test in Science and Mathematics subjects to100 students. Test had 35 items (containing fill in the blanks, true false, etc.) carrying 1 mark each (total test is of 35 marks). Teaching for control group occurred in their regular classrooms. Lesson planning was done in advance for control group. Selected topics and its contents were taught by the investigators as per their scheduled time. Lesson ended with summary and recapitulation. Experimental group were exposed to use ICT-based technology. They were taught with the help of multimedia CD having figures, text, explanation related to the content and also with the help of flipped class teaching. Investigator was present to explain the various concepts taken for teaching through the use of computer and CD-ROM. Teaching occurred for 35 minutes of a period for 30 days to complete the content assigned by the subject teacher in both control and experimental groups. Findings: Administration of the post-test was conducted after the instructional treatment and delivery of classroom teaching to both the experimental and control groups. It was found that the students taught through ICT have scored excellent in Science and Mathematics after treatment.

Keywords: ICT-based teaching, Traditional teaching, Experiment in schools Achievement in Science and Mathematics

INTRODUCTION

Traditionally, it is believed that every teacher teaches in the way he was taught by his favorite teacher. Therefore, the traditional methods of teaching kept perpetuating without evaluation for a quite long time. But the emergence of modern technology, psychology and philosophy in

Principal, DIET, Dilshad Garden, Delhi, India Email id: dranilteotia@gmail.com the field of education has brought tremendous changes in the teaching and learning methodologies. There have come several formal techniques, approaches and models which are gaining popularity now-a-days due to their usability and effectiveness. Even then, most of teachers especially in Social Sciences use old-fashioned techniques of transferring the knowledge and understanding involved in these courses. This often results into lessening of interest and lack of predestined outcomes. Resulting, the whole process of taking up the Social Sciences at school level comes under a big question. To avoid such uninvited situations, it is necessary to devise and use state-of-the-art mechanisms and technologies in the realm of teaching of Social Sciences.

Teaching is an eternal process of human development. Hence, pre-service teacher education can never be considered as sufficient to meet the needs of teachers and pupils in the times to come. There emerges a need to educate and refresh the in-service teachers in the upcoming aspects of teaching learning in classrooms. This study inclusively deals with the teachers already active in schools and taking Social Sciences at secondary level. The term 'in-service teacher education program' connotes any program provided to teachers already working in schools, with the explicit purpose of updating and renewing their knowledge, technical skills, etc., for enhancing their efficiency. In-service teacher education can be seen as a continuation of pre-service teacher education. In fact, the relevance of in-service education can be understood only when viewed in this context. Even in the case of an effective pre-service program, the impact of program on recipients can wear out over time. Teaching, being creative and individualistic requires periodic rejuvenation of teachers' attributes and upgrading of their technical know-how. Even a school teacher who has been 'an outstanding B.Ed. student' who begins his/her teaching career with great enthusiasm, equipped with an initial amount of technical know-how and the positive feedback received while 'under training', needs improvement.

Over the years, every batch of students that a teacher faces is a new batch whose entry behavior makes unforeseen demands on the same teacher, for which he/she is obviously not prepared. Most often, teachers deal with such conflict by resorting to the use of 'authority', which they assume they have over students. In-service education, which includes the training of teachers in the area which have emerged recently by conducting workshops and seminars and can be used as best and innovative practice by the institutes, would continually help effective teachers to stay effective.

TRADITIONALVS INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)-BASED LEARNING

Traditional instruction is a systematic way of planning, communicating and delivering content in the classroom. This method provides strong structure to students that help them to concentrate on their academic task. The traditional instructional approach assumes that all students learn in the same way. The role of the learners in traditional instruction as a passive listener; in this context, teacher-controlled learning environments are considered for delivering instructions.

ICT is electronic or computerized devices associated with human interactive materials that enable the user to employ them for a wide range of teaching and learning processes in addition to personal use. The rapid development in ICT and the use of computer in education have made it easier for users to access, deliver and store knowledge. Furthermore, the ability of ICT to deliver information quickly, correctly and attractively in the form of multimedia has also made learning more enjoyable.

In ICT-based teaching-learning, instructions are learner centered and highly individualized that seeks a high level of learner involvement. It is focused and targeted on learner's interest and curiosity. It is flexible to explore diverse possibilities. Many ICT-based learning programs do indeed make use of stimulants like pictures, graphics, sounds, videos, etc. ICT can bring both the best instructional process to the student. It also brings about the convergence of a stimulating and encouraging environment of learning to meet learning objectives.

MULTIMEDIA LEARNING

The modern research in the field of multimedia has often created an unwarranted hype about the superior nature of the multimedia-based learning compared to the traditional teaching methods. However, it is of paramount importance that modern day educationists realize the key factors behind the initial success of multimedia and decipher the key features that differentiate multimedia-based instruction from the traditional methods. Only after we go through this process, we would be able to understand the long-term impacts of multimedia and also realize the ways in which we can create synergy between multimedia and education. Emerging as a precious asset in pedagogy, technology is viewed as a potential element that can influence traditional education. The goals of using multimedia in education are to enhance teaching and learning and to increase the efficiency and effectiveness of the educational organization. Multimedia has been popular in this age of Science and Technology. It means an integration of sound, still images, animation video and text along with computing technology.

There is indeed amore far-away from the 'transmission' or 'passive-learner' model of learning to the 'Experiential learning' or 'active learner model'. In some instances, teachers may become more like guides and mentors, facilitators of learning, leading students along a learning path, not the primary providers of information and understanding. The students not teachers become the core of the teaching and learning process. This is a sensitive and highly politicized subject among educators, so educational software is often positioned as 'enriching' the learning process, not as a potential substitute for traditional teacher-based methods. An interactive use of multimedia in schools involves the students themselves.

SIGNIFICANCE OF ICT-BASED LEARNING AND MULTIMEDIA

A number of studies (cited in Najjar, 1996) have been conducted in the area to ascertain the effectiveness of multimedia instruction. Analysis has been done by Bosco (1986), Fletcher (1990) and Tan and Leong (2003) by examining over 200 studies. The information included sciences, foreign languages and electronics. The control group normally learnt the information via classroom or lecture combined with hands-on experiments. The comparison group learnt information via interactive videodisks or computer-based instruction. The achievement of learning was measured via test taken at the end of the lessons. Over this wide range of students, meta-analysis found that learning was higher when computer-based education was used. In conventional teaching, most of the time is consumed for input-output and less time is left for process. But in teaching with multimedia CD, the input and output time is reduced and process time is increased. When the process time is increased, the time of student's activities, discussion, correlation with other subjects, brain storming learning etc. will increase. When we do teaching with the help of multimedia CD, we get more time for the process phase, which is more important in a period of 45 minutes or 1 hour. At secondary level, the study of science comprises of physics, chemistry and biology. All natural science topics, which are later used in applied science like engineering, medical and pharmacy etc., need to be properly and clearly understood by the student for their best utilization in the future.

Now-a-days it is the need to prepare our students for the 21st century. But in the conventional method the text book, as the main teaching tool, alone is insufficient to meet the need of the students as they find it difficult to visualize the concept and to grasp information that is presented either verbally or in text. The interactive multimedia enhance effective self-learning among students. The concept of theory as well as practical can be taught with the help of animation graphics, sound etc., for example, the basic concept of human body systems can be explained through graphics (NPE1986). However, enjoyable scenario is a necessity to effective instructions. In order to achieve effective instructions, instructor need to create an enjoyable learning environment and one of the methods is to use of multimedia teaching instructions. The use of multimedia enables both synchronous and asynchronous learning. Studies conducted over the years have indicated that the use of multimedia can address different learning styles of students. The investigators felt that multimedia has contributed a lot to the field of education. Coming from a science background it craves investigator to study more about the contribution and effectiveness of ICT-based learning in comparison to conventional methods of learning.

OBJECTIVES OF THE STUDY

- 1. To study the effect of ICT teaching on the achievement of students in Science subject.
- 2. To study the effect of ICT teaching on the achievement of students in Mathematics subject.
- 3. To compare the effectiveness of ICT teaching and traditional teaching.

HYPOTHESES

Ho₁: There is no significant effect of ICT-based teaching on the achievement of learners in Science subject.

 Ho_2 : There is no significant effect of ICT-based teaching on the achievement of learners in Mathematics subject.

METHODOLOGY OF THE STUDY

In order to make sample representation, a random sampling technique was applied by using 'draw of lots' in which every individual gets equal chances of being selected. Thus, from a total of 300 students of class VI were matched on their age and sex. Only those students who were of 11 to 11.5 years of age were chosen and equal number of boys and girls was chosen. Hence, only 180 students were found meeting the matching criterion. Finally, 50 students were selected from Girls School by using 'draw of lots' technique. Similarly, 50 boys were selected from Boys School. The selected students were divided in to two groups. Therefore, out of 50 girls 25 were provided ICT teaching in Science and Mathematics and rest of girls in the group were provided traditional teaching. Similarly, out of 50 boys 25 were provided ICT teaching in Science and Mathematics.

Phase I: Pre-test

Investigator administered the pre-test in Mathematics and Science subjectsto150 students. Test had 35 items (containing fill in the blanks, true false etc.) carrying 1 mark each (total test is of 35 marks). Students were asked to fill in the entries, before distributing test papers to them, important instructions were given to them.

Phase II: Treatment

Conduction of pre-test was followed by treatment to experimental group. Conventional method was employed to teach Control group. Teaching for control group occurred in their regular classrooms. Lesson planning was done in advance for control group. Selected topics and its contents were taught by the investigators as per their scheduled time. Lesson ended with summary and recapitulation.

Experimental group was exposed to computer and ICT-based material. They were taught with the help of computer. Investigator was also present to explain the various concepts taken for teaching through the use of computer and CD-ROM. Teaching occurred for 35 minutes of a period for 30 days to complete the content assigned by the subject teacher in both control and experimental groups.

Phase III: Administration of the post-test after the instructional treatment of 30 days. Post-test was administered to both the experimental and control groups.

TOOLS AND TECHNIQUES

The content of pre-test was related to knowledge about the topics which they have studied in their previous class V. Pre-test and post-test for this study consisted of objective-type test items, i.e., fill in the blanks, multiple choice questions, matching type etc. In each of the test, there were 35 items, carrying 1 mark each. Test items were based on the objectives of education related to cognitive, affective and psychomotor domains like knowledge, comprehension and application etc. A post-test was designed from the content of National Council of Educational Research and Training Science books of class VI. The content was chosen under the assistance of the subject teachers of the selected school. The content was selected which is not taught by the regular teachers of the class VI.

DISCUSSION OF RESULTS

Table 1 and Figure 1 reveal that there is a negligible improvement in the result of the students in Science and Mathematics taught through traditional methods of teaching.

Table 1: The mean score on pre-test and post-test of control group (traditional teaching) Science
and Mathematics

Variables	N	Mean score in Science	Mean score in Mathematics
Pre-test	50	14.40	15.75
Post-test	50	16.15	17.50



It is evident from Table 2 and Figure 2 that mean value of pre-test is 14.61 and post-test is 26.30 of experimental group. Thus, it can be inferred that ICT teaching is effective in learning Science in terms of academic achievement. ICT overcomes the physical ICT barriers of classrooms as it enables the students to see visually with various visual, auditory and text-based effects.

Variables	N	Mean score in Science	Mean score in Mathematics
ICT teaching pre-test	50	14.61	15.90
ICT teaching post-test	50	26.30	27.10

 Table 2: Mean score on pre-test and post-test of experimental group in Science and Mathematics



Figure 2: Showing comparison in pre- and post-test score of Science and Mathematics of ICT teaching

Table 3 shows mean score of students in Science on post-test taught through conventional method is 16.15, whereas mean score of student taught through ICT is 26.30; similarly, mean score in Mathematics in post-test is 17.50 and 27.10 of control and experimental groups, respectively. From this, it is clear that on an average the performance of experimental group is found to be better than the control group on post-test.

 Table 3: Mean, S.D. of post-test scores and mean difference of control group and experimental group in Science and Mathematics

Groups	Mean of post-test in science	Mean of post-test in Mathematics	S.D. of post-test in Science	S.D. of post-test in Mathematics	
Control group	16.15	17.50	10.09	11.70	
Experimental group	26.30	27.10	9.16	11.81	

Table 4 indicates that the mean in pre-test and post-test of control and experimental groups is 16.15 and 26.30, respectively. Computed standard deviation of post-test scores for control and experimental groups is 10.09 and 9.16, respectively. Calculated *t*-value is 16.37, which is greater than the table value at 0.01 level of significance. Therefore, the hypothesis 'that here is no significant effect of ICT-based teaching on the achievement of learners in Science subject' is rejected. It is concluded that ICT has significant effect on the achievement of learners in Science.

Compared variable	Group	N	Mean	S.D.	d.f.	<i>t</i> -value
Score in Science	Control group	50	16.15	10.09	98	16.37
	Experimental group	50	26.30	9.16		

Table 4:	Computed t-	-value of the mea	n difference	of control and	l experiment:	al group in	Science
	1				1	0 I	

Table 5 reveals that the mean in Mathematics subject in pre-test and post-test of control and experimental groups is 17.50 and 27.10, respectively. Computed standard deviation of post-test scores for control and experimental groups is 11.70 and 11.81, respectively. Calculated t-value is 9.60, which is greater than the table value at 0.01 level of significance. Therefore, the hypothesis 'that here is no significant effect of ICT-based teaching on the achievement of learners in Mathematics' is rejected. It is concluded that ICT has significant effect on the achievement of learners in Mathematics

Compared variable	Group	N	Mean	S.D.	d.f.	<i>t</i> -value
Score in Mathematics	Control group	50	17.50	11.70	98	9.6
	Experimental group	50	27.10	11.81		

Thus, it can be inferred that ICT-based teaching along with flipped classes is effective in the learning of Science and Mathematics as compared to the conventional mode of teaching in terms of academic achievement. On the basis of the analysis of the results, the learners in ICT and conventional method for both experimental and control groups a set of findings can now be discussed to clarify the effectiveness of these two methods. Thus, it has been concluded that ICT-based teaching overcomes the physical barriers of classrooms, as it enables the students to use computer with various visual, auditory and text-based effects in education that increases the efficiency and effectiveness of the educational organization as compared to the conventional teaching, in which the use of blackboard is the main support.

CONCLUSION

The interactive nature of ICT provides immediate and comprehensive feedback to students. Leaning form ICT is an active and engaging process. The ICT system presents stores, retrieves and transmits audio, video, graphic and textual information. These kinds of systems can have

powerful impact on the learner's problem-solving abilities and can generate a positive effect. ICT-based learning is increasingly used to complement or replace conventional teaching methods. With the rapid progression in the multimedia technologies, it has become feasible to integrate multimedia technology into the teaching and learning process. What has been the conventional teacher-centered approach is now seeing a shift into one which emphasis is on student-centered learning. Traditional educational content can now be transformed into interactive multimedia content by using authoring packages. It has enabled the teacher to innovate his/her instructional design by presenting the educational content in an interactive and multi-sensory manner rather than the traditional single-media format. This infusion of ICT into teaching and learning has altered instructional strategies in educational institutions.

REFERENCES

Bosco J, 1986. An analysis of evaluation of interactive video. Educational Technology.

- Fletcher JD, 1990. Effectiveness of Cost of Intractive Video Disc Intraction in Defence Training and Education. *Multimedia Review*, Vol. 2, pp. 33-42.
- National Policy on Education 1986. Delhi: Ministry of Human Resource Development, New Delhi.
- Najjar LJ, 1996. Multimedia information and learning. *Journal of Educational Multimedia and Hypermedia*, Vol. 5, pp. 129-150.
- Sansanwal DN, 2000. Jerk Technology. Journal of Indian Education, Vol. XXVI, No. 1, pp. 17–22.
- Sansanwal DN and Singh P, 1991. Models of Teaching. Society for Educational Research & Development, Baroda.
- Sansanwal DN and Tyagi SK, 2006. Multiple Discriminant Type Item. MERI *Journal of Education*, Vol.1, No. 1, pp. 18–25.
- Tan, LH and Peggy L, 2003. Professional Development of ITE Teachers through Learning Circles, *Teacher Education Institute*, China.
- Tyagi HK, 2012. Effect of School, Gender, Age, Qualification and Experience on Role Stress: An Empirical Study on Educational Administrators of *Eritrea. International Journal of Modern Management Sciences*, Florida, USA September, 2012, Vo1 (i), ISSN 2168-5479.
- Tyagi HK, 2014. Influence of General Mental Ability, Study Habits, Reading ability and Socio-economic Status on the academic Achievements of Students. *International Journal of Education and Extension* (IJEE), Baraktullah University Bhopal, Vol. 2, No. 2, ISSN:2278-537X
- Tyagi HK, 2016. Teaching Excellence and Innovative Practices: A Case Study of National Awardee Teachers of India. *Journal of Education and Practice*, (Online) Vol. 7, No. 1.
- Watkins GL, 1996. Effects of CD-ROM Instruction on Achievement and Attitudes (multimedia computer Assisted Instruction). *Dissertation Abstracts International*, Vol. 57, No.4, pp. 1446.

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Correlates of Professional Development of Teachers: An Exploratory Study

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ABSTRACT

Aim: To study the Teaching Competency of Elementary Teachers in relation to their self-concept school support provided by their schools. Method: In first phase of the study, all MCD schools and private schools in all 12 districts of Delhi were covered under the population. In second phase of sampling, an equal numbers of teachers from both types of schools were selected. The data were collected from 60 private and 60Government School (MCD) teachers teaching in Delhi. To measure the Teaching competency of teachers, teaching competencies scale of Dr. BK Pal was used by the researcher herself. This is an Observation Teaching Scale. The scale covers the items on Questioning, Explaining, Explaining, Illustrating with an Example, Reinforcement, Stimulus Variation, Encouraging Pupil Participation, Dramatization, Narration, Recitation and Classroom Management. Self-concept was measured by using Self-Concept Questionnaire by R K Sarswat was used. The inventory contains 48 items. It provides six separate dimensions of self-concept, i.e., physical, social, temperamental, educational, moral and intellectual selfconcept. It also gives a total self-concept score. The alternatives given in SCQ were arranged in such a way that the scoring system for all the items would remain the same, i.e., 5,4,3,2,1, whether the items were positive or negative. The summated score of all the items provides the total self-concept score of an individual. A high score on the questionnaire indicates a higher self-concept, while a low score shows lower self-concept. School support was measured by applying self-constructed and standardized tool (Bharti, 2017). This tool consists of six dimensions, i.e., Physical, Academic, Social, Professional Development, Information and Communication Technology and Human Resource. Each dimension contains a set of items. In this way, the entire tool consists of 42 items. The toot was administered on a group of teachers. Findings: Female are more competent and skillful, more flexible, adaptive and creative which is found in various studies. Influence of age on teaching skill as individual learns through experiences as age increases knowledge increases. Experience and age both goes hand in hand. As if age increases competency also enhanced. Male teachers are less competent this may be due to their major involvement in the family than two other. Private school teachers are exposed to apply newly learned knowledge in their classes.

Keywords: Professional development, School support and Teaching, Self-concept, Teaching skills

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PROLOGUE

Education is the most important tool, evolved by man, for one's progress. It is, therefore, no wonder that all dynamic and progressive nations demand an educational system that will take leadership in piloting and managing a future that ensures a better life to all. In the context of developing countries, education will eventually have a great role in the process of sustainable development. Hence, the progress of any society depends mainly on the utilization of the potential of its individuals and the best educational ideas in all disciplines of knowledge. Evidence shows that there has been an enormous advancement of knowledge in every field. Presently, India's educational purpose is the one that envisages to creating a good and valued society, an enlightened life for all its members and using all the intellectual and natural resources to that purpose (Allam and Tyagi, 2011).

Successful Teaching

It is believed that teacher education should lead to better academic performance on the part of teachers, through the regular acquisition of new skills and competencies and through the upgrading of existing ones. The assessment of performance of teachers therefore remains an essential precondition for enhancing the effectiveness of educational processes (Gupta and Tyagi, 2016). Practices and procedures adopted for assessing teacher performance are based on the assumption that this assessment will lead to better performance. Different ways of appraising teachers are utilized, such as the reports of the Head teachers, reports by the Inspector of schools, and reports by a panel of three experts who visit schools for several days and provide a comprehensive report. Major changes in the system of inspection and supervision were recommended by the National Commission on Education (1964–1966), which reported at a time of expansion in the education system and, under the circumstances, policy makers did not focus much on the "inspection and supervision" aspect of the report. The National Policy on Education (1986) recommended that the system of inspection and supervision be transformed into an "academic support system" and, as a result, several initiatives have been taken to improve the existing system of teacher evaluation.

Specific programs to orient (and re-orient) supervisory staff have therefore been regularly conducted by institutions. Considerable research has been undertaken over the past three decades on teaching, teaching efficiency and teaching effectiveness (Rajput and Walia, 2001). Most studies have taken samples of respondents according to the variables of geographical region, teacher qualifications, social and economic background, cultural contexts and the rural/urban divide.

As a result of such research, it has been found that teacher attitudes, academic goals, socioeconomic status, age and teaching experience are good predictors of teacher effectiveness (Venkatiah, 1998; Lakshmi, 1998; Mishra, 1998). Highly effective teachers were found to be more intelligent and more conscious of self than were other teachers. They were also less
suspicious, less guilt prone and less radical; while intelligence and knowledge in their areas of responsibility were found to be the best predictors of teacher effectiveness. The geographical region, designation, age, experience and family size of teachers have also been found to significantly influence their level of teaching effectiveness (Tyagi and Mathur, 2011); while no significant variations have generally been observed between male and female teachers with respect to teacher effectiveness.

Effective teachers engage themselves in teaching activities, school work, in-service education programs and activities outside the school. The efficiency of teachers was found to be affected by job satisfaction, social and family conditions. Studies have also been conducted on the perceptions of learners in schools, regarding effective and ineffective teachers. Students in classrooms viewed effective teachers as ones who are favorably inclined toward their students, who attempt to infuse good qualities in learners, provide remedial inputs for learners on an equal footing and without prejudice, and who are conscientious and act as an effective guide (Kulandalvel and Rao, 1968). As a result of such research findings, it is necessary to have a fresh look at the existing appraisal system. The operationalization of village education committees responsible for managing schools, including recruitment and teacher assessment, is a recent development which is being observed with keen interest, since it has the potential to restore the age old close relationship in India between schools and community. Assessment practices will also need to change due to the massive impact of the new information technologies, which have the capacity to change the concept of traditional classrooms and transform the role of teachers (Gupta and Harish, 2017).

The existing teacher appraisal systems rely heavily on teaching performance being linked to the examination results of students, while other indicators such as innovativeness, community acceptability, interactive abilities and productivity in terms of the production of innovative teaching/learning materials and the like, receive negligible attention. The appraisal of those undertaking teacher assessment also warrant serious attention, since any assessment that is not objective and is conducted by un-prepared evaluators can do more harm than good (Rajput and Walia, 1998). In this regard, the National Council for Teacher Education has recently identified key areas with regard to teacher competency, commitment and performance, including: contextual, conceptual, content, transactional and management competencies. In addition, competencies have been identified relating to other educational activities, such as: developing teaching/learning materials and working with parents (on the one hand) and working with the community and agencies (on the other). With regard to commitment, commitment to the learner, to the community and society, to the profession, and to knowledge and appropriate values, are used to define what is expected of the committed teacher. The significance of commitment is judged by the community through performance, for which five major areas have been identified, namely: performance in and outside the classroom and within the school; performance related to dealing with parents; and performance related to the wider community. It has been suggested by the National Council for Teacher Education that these areas, when

taken together, provide the guiding factors in assessing teacher effectiveness through welldesigned and professionally conducted appraisals. Teachers need to be convinced as to the desirability of accepting such assessment, since it provides an opportunity for remedial inputs for both themselves and their institutions.

TEACHING COMPETENCY

Competency is a term used extensively and hence, it is needless to say that, it is defined in different ways, Teacher education and the job performance of the teacher is one of the contexts in which the term is used. Pal and Shyam Sunder (2016) stated that "competencies are the requirements of a competency-based teacher education, which includes the knowledge, skills and values the student, must demonstrate for successful completion of the program. Similar views were expressed with respect to the meaning of a competency by McNamara (1992). According to DPEP, Tamil Naidu (1996) teacher competence refers to "the right way of conveying units of knowledge, application and skills to students". The right way here, includes knowledge of content, processes, methods, and means of conveying content in an interesting way, involving the activities of students.

NEED AND SIGNIFICANCE OF STUDY

Traditionally, it is believed that every teacher teaches in the way he was taught by his favorite teacher. Therefore, the traditional methods of teaching kept perpetuating without evaluation for a quite long time. But the emergence of modern technology, psychology and philosophy in the field of education has brought tremendous changes in the teaching and learning methodologies. There have come several formal techniques, approaches and models which are gaining popularity now-a-days due to their usability and effectiveness. Even then, most of teachers especially in science use old-fashioned techniques of transferring the knowledge and understanding involved in these courses. This often results into lessening of interest and lack of predestined outcomes. Resulting, the whole process of taking up the science at school level comes under a big question. To avoid such uninvited situations, it is necessary to devise and use state-of-art mechanisms and technologies in the realm of teaching of science.

METHODOLOGY

In first phase of the study, all MCD schools and private schools in all 12 districts of Delhi were covered under the population.

In second phase of sampling, an equal numbers of teachers from both types of schools were selected. The data were collected from 60 private and 60 Government School (MCD) teachers teaching in Delhi. To measure the Teaching competency of teachers, teaching competencies scale of Pal (2009) was used by the researcher herself. This is an Observation Teaching Scale. The scale covers the items on Questioning, Explaining, Explaining, Illustrating with Example, Reinforcement, Stimulus Variation, Encouraging Pupil Participation, Dramatization, Narration, Recitation and Classroom Management.

Self-concept was measured by using Self-Concept Questionnaire by Sarswat (1984) was used. The inventory contains 48 items. It provides six separate dimensions of self-concept, i.e., physical, social, temperamental, educational, moral and intellectual self-concept. It also gives a total self-concept score. The alternatives given in SCQ were arranged in such a way that the scoring system for all the items would remain the same, i.e., 5,4,3,2,1, whether the items were positive or negative. The summated score of all the items provides the total self-concept score of an individual. A high score on the questionnaire indicates a higher self-concept, while a low score shows lower self-concept.

School Support was measured by applying self-constructed and standardized tool (Bharti, 2017). This tool consists of six dimensions, i.e., Physical, Academic, Social, Professional Development, Information and Communication Technology and Human Resource. Each dimension contains a set of items. In this way, the entire tool consists of 42 items. The toot was administered on a selected group of teachers.

OBJECTIVES OF THE STUDY

- 1. To study the core teaching skills of private and government school teachers.
- 2. To study the relationship between core teaching skills and self-concept.
- 3. To compare the school support system of MCD and private schools.

HYPOTHESES

 H_1 : There is a significant difference in core teaching skills of private and government school teachers.

Table 1: Showing mean score, SD and value of 't' on the core teaching skills of government teacher	rs
and private teachers	

Compared group	N	Mean	SD	d.f.	<i>'t'</i> value
Government	60	159.31	12.02	118	4.04*
Private	60	167.65	10.60		

*Significant at 0.01 level; Significant at 0.05 level

The Table 1 reveals that the mean score of government teachers is 159.31 and the mean score of private teachers is 167.65, whereas SD of government and private is 12.02 and 10.60, respectively. The calculated 't' value is 4.04, which is higher than the table value and significant at both the levels 0.01 and 0.05. Here higher the mean score, higher the competency in teachers.

Therefore, it can be concluded that private teacher's mean score is high and more competent than the government teachers. Hence, the hypothesis 'that there is significant difference in core teaching skills of private and government teacher' is accepted.

Table 2: Showing mean score, SD and value of 't' on the core teaching skills due to age of government
teachers and private teachers

Compared Group	N	Mean	SD	d.f.	<i>'t'</i> value
Less Age (25-38 years)	67	150.32	11.45	118	3.90*
More Age (39-60 years)	53	162.82	8.15		

*Significant at 0.01 level; Significant at 0.05 level

H₂: There is a significant difference in core teaching skills of teachers in relation to their age.

The Table 2 reveals that mean score of less aged teachers is 150.32 and that mean score of more aged teachers is 162.82, whereas SD of less and more aged teachers is 11.45 and 8.15, respectively.

The calculated t value is 3.90, which is higher than the table value and significant at both levels 0.01 and 0.05. Here higher the mean score higher the competency in teachers. Hence, hypothesis that 'there is significant difference in core teaching skills of teachers in relation to their age' is accepted.

H₃: There is significant difference in core teaching skills of teachers in relation to their experience.

Table 3: Showing mean score, SD and value of 't' on the core teaching skills of government teachers and private teachers

Compared Group	N	Mean	SD	d.f.	<i>'t'</i> value
Less experience (2-8 years)	71	154.20	10.01	118	11.76*
More experience (8+years)	49	160.79	9.00		

*Significant at 0.01 level; Significant at 0.05 level

The Table 3 clearly indicates that the mean score of more experienced teachers is 160.79 and is significantly higher as compared to the mean score of less experienced teacher which is 154.2.

The Standard deviation (SD) of less and more experienced teachers of private and government is 10.01 and 9.00, respectively. The calculated 't' value is 11.76, which is higher the table value and significant at both the level 0.01 and 0.05.

This shows that there is significant difference in core teaching skills of teachers in relation to their experience. Here, higher the mean score higher the competency in teachers. Hence, the hypothesis that 'there is significant difference in core teaching skills of teachers in relation to their experience' is accepted.

 H_{4} : There is significant difference in core teaching skills of teachers in relation to their gender.

The Table 4 indicates that mean score of total male (private and government) is 150.19 and SD

Table 4: Mean score on competency of total female and male school teachers of both types of schools								
Compared Group of Private and Government teachers	N	Mean	SD	d.f.	't' value			
Male	60	150.19	11.1	118	7.5*			
Female	60	162.30	12.17					

*Significant at 0.01 level; Significant at 0.05 level

is 11.1, and the mean score of total female (private and government) is 162.30 and SD is 12.17. The calculated t value is 7.5, which is higher than the table value therefore the hypothesis that 'there is significant difference in core teaching skills of teachers in relation to their gender' is accepted.

 H_5 : There is significant difference between the school supports of MCD School teachers and Private School teachers.

Table 5: Mean value, Standard Deviation, *t*-value and d.f. value of School support of MCD and Private school teachers

Compared Group	N	Mean	SD	d.f.	<i>t</i> -value
MCD School Teachers	60	44.1	3.16	118	5.55*
Private School Teachers	60	45.6	1.5		

*Significant at 0.01 level; Significant at 0.05 level

Table 5 reveals that the mean of School support of MCD school elementary teachers is 44.1 and standard deviation is 3.16, whereas the mean of school support of Private school elementary teachers is 45.6 and standard deviation is 1.5. The *t* value for the two groups is 5.55, which is higher than the table value 2.78 at 0.01 level of significance. Therefore, the hypothesis that 'there is difference between the school supports of MCD School teachers and Private School teachers' is accepted. It can be concluded that the private school teacher are given exposure and freedom to enhance their skills by attending seminars, workshops and apply the new knowledge in their classes.

DISCUSSION OF THE RESULTS

After analyzing the data it is clear that the private teachers are more competent and effective than the government school teachers. It may be concluded that these teachers are provided exposure through school support and all the possible opportunities are provided to enhance their competency in teaching. Second, the schools are equipped with modern facilities, i.e., computers, smart boards etc. In this way, private schoolteachers use the instructional techniques, methods and media related to the teaching objectives, communicate more frequently with students in the classroom, reinforce and encourage students' involvement in instruction and organize time, materials and equipment appropriate for instructions. If teachers can improve their communications and performance inside classroom they would be in a better position to communicate and understand their students as well as infer their self-concept or another reason for their effectiveness is they are also sent to attend various programs organized by professional bodies.

Female teachers are more competent, skillful, flexible, adaptive and creative found in various studies. Female are more sincere toward their duty, second most important thing may be there household duty is being shared by their counterparts, therefore, they are more effective and concentrated in their field.

Influence of age on teaching skill as individual learns through experiences as age increases knowledge increases. So age directly affect the teacher competency level. Experience and age both goes hand in hand. As if age increases competency also enhanced.

Male teachers are less competent because they play a major role in the family, more involvement in other fields. Due to industrialization and modernization, people are not restricted to a particular field, all are spreading their wings in different directions. Here, teachers are not limited to their teaching after completing their school duty they are going to other income generated activities and that's why men are not fully devoted to their work.

EPILOGUE

Now-a-day's schools are focusing toward increasing their productivity. This can be best done by improving the classroom condition. One very important person that is the teacher further can help in improving it. If the teacher is effective and has the right attitude toward his/her profession, he/she will be able to foster all the necessary qualities and skills in the students. Teacher with firm knowledge of subject and built on that with a clarity and understanding design to help students, master the material, transfer should be effective only when the teacher is efficient and using of skills in the classroom make teacher competent. Same time, it is also the responsibility of the school administrators to give all the support to its staff for the their growth and enhancing their skills.

REFERENCES

- Allam Z and Tyagi, HK, 2010. Influence of Socio-demographic Factors on Job Burnout and Satisfaction among Eritrean Medical Workers, Nigerian. *Journal of Psychiatry*, Vol. 8, No. 1.
- DPEP, 1996. Appraisal Mission, Second IDA credit Feb 18- March 18, 1996 Aide memorie, New Delhi, Ministry of HRD, DPEP Bureau.
- Gupta AS and Tyagi HK, 2016. Teaching Excellence and Innovative Practices: A Case Study of National Awardee Teachers of India. *Journal of Education and Practice*, (Online) Vol. 7, No.1.
- Gupta N and Kumar H, 2017. Is In-Service Training A Determinant for Changing the Teaching Attitude of Teachers? An Experiment in Indian Schools, *Journal of Teacher Education, and Research*, Ram-Eesh Institute of Education, Vol. 12, No. 1, June 2017, ISSN 2454-1664, Print ISSN : 0974-8210, Online ISSN : 2454-1664

- Kulandalvel K and Rao TRB, 1968. Qualities of Good Teachers and Good Students. R.K. Mission Vidyalaya, Coimbatore.
- Lakshmi NU, 1998. Impact of In-Service Training on Teacher Empowerment with Special Reference to Professional Skills of Primary Teachers. Project on Teacher Empowerment and School Effectiveness at the Primary Stage. *National Council of Educational Research and Training*, 23–25 July, New Delhi.
- Mishra JK, 1998. Teacher Empowerment Issues Related to the Development of Local Specific Competency Based Curriculum at the Primary Level. Teacher Empowerment and School Effectiveness at the Primary Stage. *National Council of Educational Research and Training*, 23–25 July, New Delhi.
- McNamara TP, 1992. Theories of priming: I. Associative distance and lag. *Journal of Experimental Psychology: Learning, Memory, and Cognition, Vol. 18*, No. 6, pp. 1173-1190.

Pal BK and Shyam Sunder, 2016. A Hand book on Micro Teaching, DIET, SCERT, New Delhi

Rajput JS and Walia K, 2001. Reforms in Teacher Education in India. *Journal of Educational Change*, Vol. 2, No. 3, pp. 239–256.

Saraswat RK, 1984. Manual for Self concept questionnaire, Agra: National Psychological Corporation.

Venkatiah N, 1998. Impact of Inputs provided in DIETs on Teaching Competency in Teacher Empowerment and School Effectiveness at Primary Stage, NCERT. New Delhi.

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Using Rasch and Winsteps to Promote English Grammar Skills in Secondary School Students

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ABSTRACT

This research paper reports a quasi-experimental research in the implementation of Item Response Theory (IRT) with Macao secondary school students. The intervention exemplified the principles of the Construct Modeling approach and the Rasch Model analysis to explore the feasibility of using these models in a daily classroom context and its effectiveness in terms of optimizing students' learning. Its purpose was to seek an alternative way to evaluate students' learning by locating their Zone of Proximal Development in order to provide instructional support to meet students' learning needs. This study found students were more motivated and more accountable for their own learning when their needs were addressed directly. The study also shows that the implementation of IRT requires additional and careful planning while differentiation in student support is essential to make learning effective and efficient.

Keywords: Macao, English assessment, Rasch, Winsteps

INTRODUCTION

In Macao, English has never been an official language during or after the colonial period, but it plays a significant role. The English language can be found in several curricula in Macao schools as a compulsory subject in addition to Chinese, one of the official languages. Since the casino concessions in 2002, Macao has attracted many expatriates and more foreign visitors, transforming the region into an international business hub, hence, the use of English has become an imperative language in both business and education settings.

Schools design and teach English based on their own interests following routines and practices of their own (Young, 2009). However, the learning outcomes are not significant (Sansom, 2016) as there are no territory-wide examinations. There are also gaps between the levels of secondary graduates and requirements of tertiary level (Young, 2009). In addition, many students are retained, which has even become a concern in Macao (Wong *et al.*, 2016).

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In order to cope with this problem, many schools have applied subsidies to provide additional after school tutorial lessons. Nevertheless, the selection of the students attending these tutorials is based on traditional summative assessment. As a result, investment on such supplementary tutorial lessons to promote English learning only results, quite often, in the waste of time and human resources (Ho *et al.*, 2018).

According to Vygotsky (1978), the Zone of Proximal Development (ZPD) is the gap between what a child has already mastered and the knowledge he or she can achieve through guidance from an adult or a more able peer. By locating the learner's ZPD, teachers are able to understand what the learner already knows and what level of knowledge he or she is able to master if given instruction, thus, enables teachers to make efficient instructional decision and provide assistance accordingly (Wei, 2017).

The Rasch model is the most widely used framework in Item Response Theory (IRT) family (Heydari, 2015). It measures the relationship between the items and the examinees' performance by placing the item difficulties and the individual's ability on one logit scale (Li and Luo, 2014) to make it possible to locate the ZPD of each individual (Yao and Mok, 2013).

The Construct Modelling approach, another theory developed from IRT, is also being integrated with the Rasch Model analysis to examine the hierarchies of the learning content (Taylor *et al.*, 2011). With such information, teachers are able to understand the needs of any student, design and provide learning support accordingly.

As traditional summative assessment practices do not provide efficient feedback for teachers to make instructional decisions, this study sought to implement the Construct Modelling approach (Wilson, 2003) and the Rasch Model analysis as a Formative Assessment tool (Yao and Mok, 2013) to assess student learning. Winsteps (Linacre, 2011), the Rasch assessment tool, was used to evaluate the results of English Grammar quizzes so as to examine what information can be generated to help teacher check regarding the hierarchy of English grammar knowledge within the overall scale. These results were used to locate the ZPD of each student in order for teachers to design effective instructional support to optimize the learning outcomes in daily classroom practice.

Quasi-Experimental design was applied to conduct the study. The purpose of the study was to investigate the usefulness of the Rasch Model in generating a hierarchy of English grammar knowledge and to help teachers locate the ZPD of each student in an English language class. By administrating the intervention and collecting data for comparison, it sought to answer the four research questions: (1) What information can the Construct Modeling and the Rasch Model analysis generate to help teachers check the hierarchy of English grammar knowledge within the overall scale? (2) How can the information generated by the Rasch Model locate the ZPD of each student and help teachers generate instructional support? (3) In what way can the instructional support based on the Construct Modeling approach and the Rasch Model foster

learning? (4) What suggestions can be made in terms of applying IRT in teaching process to promote learning?

Quizzes are key components for students, in particular, and society, in general, for ranking and recognition purposes. Yet, this importance should concern teachers, as well, for content teaching adaption based on each student knowledge level. Hence, the goal of this exploratory case study was to help English language teachers in Macao to customize their teaching to students' needs after every regular class quiz. This happens because, quite often, the teaching of any classroom follows a "one-fit-for-all" strategy.

By using ZPD and Winsteps, it is possible to customize the teaching process, leading to a promising pedagogical practice for every quiz-based content. Somehow, outcomes of quizzes can be used to understand students' progress patterns, allowing teachers to customize their lesson plans and pedagogical approaches to meet the needs of the students.

Besides the present section that introduces the background of this empirical study, the research questions and its purpose, this paper consists of nine other main sections. The second one highlights the multi-context of languages in Macao while the English curriculum in non-tertiary education systems is discussed in the section The English Curriculum in Non-Tertiary Education. Section four and five present methodological and pilot study considerations. The Rasch analysis and statistical *T*-tests are highlighted in the section Data Analysis. In the section Addressing the Research Questions and Other Findings, the four research questions and other findings are interpreted but not forgetting the limitations that surrounds this research in section nine. Besides the bibliography and the appendix to support this work, recommendations for school teachers are addressed in the section Recommendations for Teachers.

THE MULTI-LANGUAGE CONTEXT OF MACAO

Macao situates in the southeast of Mainland China to the west of the Pearl River Delta (bordering on Guangdong Province) and is approximately 60 km from Hong Kong. It consists of three sub-regions: Macao peninsula and two islands, Taipa and Coloane, which are linked by Cotai Reclamation area (MSAR, 2016). It has a total population of 649,100 habitants (DSEC, 2016a) in a total area of 30.4 square kilometers (DSEC, 2016b).

Historically, the Portuguese came to Macao for shelter in 1513 and later utilized it as a trading center to China and other Far East countries. In 1897, the Portuguese were allowed to exercise its administration in Macao because of the Treaty of Peking and refined as a Chinese Territory under Portuguese administration. In 1987, it was agreed to return to Chinese sovereignty from 20 December in 1999 as listed in the Sino-Portuguese Joint Declaration (Shan and Leong, 2008).

Meanwhile, Macao has changed, particularly with the long-term development of the gaming industry, tourism and world trade. As expected, it is foreseeable that the importance of English

is growing in Macao (Young, 2007). Local researchers have also been urging the establishment of a permanent language policy to promote English learning and cultivate English-speaking human resources to cope with the future need in the development of Macao as an international city (Young, 2011).

In the latter half of the twentieth century, schools under various media of instructions had developed and could be found coexisting in Macao: the official Portuguese school, the Chinese schools, the Sino-Portuguese schools and the English schools (Shan and Leong, 2008), which still exist in the educational context in Macao today (Table 1).

Medium	School type											
of instr-		ivate	Public				Total No. and %					
uction	No. of Schools	%	No. of Students	%	No.of Schools	%	No. of Students	%	No. of Schools	%	No. of Students	%
Chinese	82	74.6	60,727	83.6	10*	9.1	2,371	3.3	92	83.7	63,098	86.9
Portug- uese	1	0.9	539	0.8	3	2.7	173	0.2	4	3.6	712	1.0
English	14	12.7	8,803	12.1	-	—	_	—	14	12.7	8,803	12.1
Total	97	88.2	70,069	96.5	13	11.8	2544	3.5	110	100.0	72,613	100.0

Table 1: The number of schools and students in Macao in 2015/2016 (DSEJ, 2016)

THE ENGLISH CURRICULUM IN NON-TERTIARY EDUCATION

After the promulgation of the Law No. 9/2006 (DSEJ, 2016), the administrative regulation No. 15/2014 was issued to provide the instructional guidelines of the construction of curriculum for infant and primary, junior and senior secondary education in Macao. Thus, all the public and private schools must apply these principles when designing their own curriculum.

For instance, the kindergarten education consists of five learning areas as teaching activities, including languages. Yet, schools may design themes or units for cross-subject learning. Therefore, no specified duration is assigned to individual learning areas. Starting from Primary, the learning language and literature area are divided into two subjects: First and Second Language. The durations of both subjects are 49,920 minutes to 83,200 minutes and 41,600 minutes to 58,240 minutes, respectively, which account for 22.2% to 28.6% and 18.5% to 20% of the total duration of the education activities, respectively. Both of First and the Second Language are 20,600 minutes to 28,840 minutes in Junior Secondary and 18,600 minutes to 26,040 minutes in Senior Secondary education, which takes up 17.5% to 17.8% and 16.3% to 16.7% of the total duration of the educational activities (DSEJ, 2016).

RESEARCH DESIGN AND METHODOLOGY

This quasi-experimental study comprised of three action research cycles addresses three different topics of English Grammar. It began with a pilot study to establish the conceptual ideas and the

Construct Map. The division of each level was made in accordance with the extensive study of the instructional sequences in the textbooks as well as the researcher's experiences as an English teacher. This map was served as guidance for teaching and design of the preliminary test. More importantly, it was the benchmark for the comparison with the Rasch Analysis in the latter phase of this empirical study.

After the teaching progress of each topic, preliminary tests were given to students to evaluate their learning. The generation of Wright Map as the Rasch Analysis was also conducted at this stage in an attempt to evaluate the previously established Construct Map and locate the students' understanding. Meanwhile, supplementary exercises referring to various hierarchies in the revised Construct Maps were, then, designed accordingly and provided to the students as the intervention took place.

At the accomplishment of the intervention, a second test was given to the students a week after the preliminary test (Figure 1). These results were served as comparison with the preliminary test to evaluate the effectiveness of the intervention. In order to explore the holistic picture of the treatment, semi-structured interviews were conducted before and after the second tests to investigate students' perceptions. Additionally, research diary entries were logged throughout the whole process to provide descriptive data.

Again and for reference, the purpose of this research is to seek an alternative form of assessment to foster learning by locating the current progress of the students and providing support accordingly, thus, avoiding the typical waste of human effort and other resources. The researchers believe that by locating the ZPD, students can be supported more specifically, effectively as well as efficiently.



PILOT STUDY

The pilot study took place in October 2016. The participants were senior students from a Chinese-medium secondary school in Macao. They were grouped in accordance with their English examination results in the previous academic year (2015/2016). They were assigned into three groups, namely, higher, medium and lower level (Table 2). Moreover, such division revised every term based on the students' academic results of that term. The preliminary test gave at the end of the two-week teaching whose results were analyzed with Winsteps. Alteration of the Construct Map was made based on the Wright Map of the preliminary test. The supplementary exercises were then given to students according to their ZPD illustrated by the Wright Map (Appendix). Finally, a second test of the same learning content was given to the students.

	Male		Fe	emale	Total		
	N	%	N	%	N	%	
Higher level	23	42.6	18	33.3	41	75.9	
Lower level	7	13	6	11.1	13	24.1	
Total	40	55.6	24	44.4	54	100	

Table 2: Sample distribution by ability and gender number

Cohen *et al.* (2010 suggests that triangulation could be defined as the utilization of two or more methods to collect data in a study, which is also as a powerful way to demonstrate concurrent validity, especially in qualitative research. Table 3 highlights the triangulation methods used on each research question.

Table 3: Triangulation matrix of the study

Research Question	Data Source 1	Data Source 2	Data Source 3
What information can the Construct Modeling approach and the Rasch Model analysis generate to help teachers check the hierarchy of English grammar knowledge within the overall scale?	Test results		
How can the information generated by the Rasch Model analysis locate the Zone of Proximal Development (ZPD) of each student and help teachers generate instructional support?	Test results	Semi- structured interviews	
In what way can the instructional support based on the Construct Modeling approach and the Rasch Model analysis foster learning?	Test results	Semi- structured interviews	
What suggestions can be made in terms of applying Item Response Theory (IRT) in teaching process to promote learning?	Test results	Semi- structured interviewed	Research diary

As well, the Rasch Analysis was applied to investigate the results of the preliminary test while the paired *t*-test was also utilized to compare these outcomes within each group (Table 4). Further content analysis was applied to explore the semi-structured interviews, including the research diary for comparison purposes of the Rasch and Construct Maps.

Research question	Data source 1: Test results	Data source 2: Semi-structured interviews	Data Source 3: Research diary
One	Rasch analysisContent analysis		
Two	Rasch analysis	Content analysis	
Three	Paired samples T-test	Content analysis	
Four	Paired samples T-test	Content analysis	Content analysis

Table 4: Methods used in data analysis

DATA ANALYSIS

The Paired *t*-test

The paired *t*-test was applied to investigate the following hypotheses: H0 - There is no significant difference in Grammar test results among students before and after the intervention; <math>H1 - There is a significant difference in Grammar test results among students before and after the intervention. As shown in Table 5, the null hypothesis was rejected for a 95% level of confidence. Hence, it can be concluded that students performed better after the intervention, in general. However and according to Table 6, this outcome did not match the one of the Pilot Study.

Table 5: Paired T-test regarding the English grammar before and after the intervention (I	Pilot
Study)	

Pilot Study	x^2	SD (<i>B</i>)	x^2	SD (A)	$x^2(B-A)$	t	d.f.	Sig.
	(Before)		(After)					(2-tailed)
Experimental	7.78	1.79	8.44	1.66	-0.67	2.7850	53	0.0074
groups								
Class C	6.00	2.55	6.62	2.18	-0.62	0.7259	12	0.4759
Class D	8.25	1.16	8.90	0.72	-0.65	2.1557	19	0.0441
Class G	8.43	0.75	9.14	1.01	-0.71	3.2501	20	0.0040

From the analysis of Table 7, the same previous null hypothesis was rejected globally. It can be clearly stated that there was a strong decrease in the second tests among students of the control groups (Cycle 1).

Agreeing with Table 8, a moderate decrease in the second tests after the intervention groups could be found with a minor and null average grade decrease for classes G and F, respectively, and a moderate average grade decrease with Class A.

Table 6: Paired <i>t</i> -test of experimental groups (Cycle 1), where the null hypothesis was accepted for
all classes

Cycle 1	x^2	SD (<i>B</i>)	x^2	SD (<i>A</i>)	$x^2(B-A)$	t	d.f.	Sig.
	(Before)		(After)					(2-tailed)
Experimental groups	6.96	1.81	6.72	2.13	0.25	0.7898	52	0.4332
Class C	5.08	1.73	4.42	1.68	0.67	0.8324	11	0.4229
Class D	7.45	1.39	7.40	1.85	0.05	0.1070	19	0.9159
Class G	7.57	2.50	7.38	1.72	0.19	0.4000	20	0.6934

Table 7: Paired *t*-test results of control groups (Cycle 1)

Cycle 1	<i>x</i> ²	SD (<i>B</i>)	x^2	SD(A)	$x^2(B-A)$	t	<i>d.f.</i>	Sig.
	(Before)		(After)					(2-tailed)
Control groups	7.76	1.66	6.09	2.48	1.67	4.1621	32	0.0002
Class A	7.95	1.40	7.29	1.98	0.67	1.8150	20	0.0846
Class F	7.42	2.07	4.00	2.82	3.42	5.2971	11	0.0003

Table 8: Paired T-test of experimental groups (Cycle 2)

Cycle 2	x^2	SD (<i>B</i>)	x^2	SD (A)	$x^2(B-A)$	t	d.f.	Sig.
	(Before)		(After)					(2-tailed)
Experimental groups	6.32	2.67	5.19	2.82	1.13	3.9702	52	0.0002
Class A	7.19	1.78	5.10	1.73	2.10	5.3755	20	0.0001
Class F	2.83	2.25	2.83	2.66	0.000	0.0000	11	1.0000
Class G	7.50	1.82	6.70	2.94	0.80	1.6512	19	0.1151

At last and based on Table 9, the null hypothesis was also rejected for all classes, that is, it can be inferred that there was a significant decrease in the second test among the control groups in Cycle 2.

In summary, there was a significant improvement in the experimental groups in the Pilot Study while decreases were noticed in both sets of groups in Cycle One and Two. Yet, the students in the experimental groups had always a better performance than students of the control groups.

The Rasch Analysis

This approach was applied to the preliminary tests with Winsteps. The Wright maps (see Appendix) of each preliminary test was generated for two purposes: (1) To compare with the previously established Construct Maps and to create the corresponding supplementary exercises

Fable 9: Paired t-test of control groups (Cycle 2)												
Cycle 2	x ² (Before)	SD (<i>B</i>)	x ² (After)	SD (A)	$x^2(B-A)$	t	d.f.	Sig. (2-tailed)				
Control groups	5.24	2.67	3.91	2.90	1.32	4.4912	33	0.0001				
Class C	3.69	2.18	1.77	1.59	1.92	5.2511	12	0.0002				
Class D	6.19	2.54	5.24	2.74	0.95	2.3505	20	0.0291				

as intervention; (2) To locate students' current progression to assign relevant supplementary exercises as intervention.

Briefly, a Wright Map consists of two columns in order to place the respondents and the items on the same scale. The respondents were found on the left column and the items were on the right. The students with higher ability were located on the upper portion of the scale while the less able students were found on the lower part of the map. Similarly, the most difficult items were placed on the top of the map while the easiest ones were located at the bottom of the scales.

Under the Pilot Study Wright Map, it can be noted that students could recognize indicator (adverbs of frequency) and give relevant answers even in a more complex context (Q7). Additionally, the results showed that they needed further consolidation in putting the verbs into the negative and the interrogative forms, which was initially regarded as more manageable (Q3 and Q4). Overall, the results showed that students had more difficulties in recognizing the hints rather than understanding simple context (Q5 and Q6).

For Cycle One, it was confirmed that the students were able to recognize the relationship between two past actions when one was in progress and another happened suddenly as expected (Q1 and Q2). They could also distinguish the adverbs of time indicating an action in progress or a complete past action (Q3, Q4 and Q5). However, the major surprise came from the students who were able to identify verbs which could not be used in continuous tense even in a more complex context (Q9) but failed to use the same tense for verbs joined by conjunction (Q10), which made the level of the last question outstanding the rest of the preliminary test.

With Cycle Two, the Construct Map and the Rasch Analysis revealed higher level of alignment: (1) As predicted, pronoun was the element that affected students the most (Q7, Q8, Q9 and Q10); (2) Reporting questions (Yes/No questions or wh-word questions) were the most difficult task for students (Q9 and Q10). However, reporting commands were an easier task for students than reporting statements (Q1 and Q2) even the commands contained more elements that needed changing (Q3). A factor indicating four unfamiliar elements (ago, tomorrow morning, come and bring) was missed in the Construct Map, thus, affected the students from answering the questions correctly (which also resulted in making the questions into higher hierarchies - Q1, Q2 and Q4).

ADDRESSING THE RESEARCH QUESTIONS

Research Question 1

It is noticeable that the established Construct Maps in this study varied from the results of the Rasch Analysis in term of the hierarchies of each English grammar knowledge. First, for the content that was regarded as manageable was found more difficult for the students. In the Pilot Study, the researchers predicted that the students were able to put the verbs of the simple present and the present continuous tense into the negative and the interrogative form. However, the results of the Rasch Analysis showed that the questions referring to that part of content (Q3 and Q4 in the preliminary test) were in a higher hierarchy, meaning students found it difficult. Additionally, in Cycle One, students were noted to be able to distinguish verbs not used in continuous tense in more complex context (Q9 in the preliminary test) but could not use the same tense for verbs joined by conjunction (Q10 in the preliminary test). In Cycle Two, reporting command with two elements that needed changing (Q3 in preliminary test) was an easier task for students than reporting statement contained one element that needed to be changed (Q1 and Q2 in preliminary test).

Second, the missing factors or elements hindered students in giving correct answers and differed from the hierarchies of the Construct Maps. The above-mentioned circumstance (when students failed to put verbs linked by conjunction in Cycle One) is one of them. Such miscounted factor made the question outstanding from the rest in the preliminary test and a new level had to be added in the revised Construct Map. In Cycle Two, Q4 in the preliminary tests originally represented Level 2 that students were able to distinguish the different sentence types and rephrase the question into the indirect or reported speech correctly. However, students were found unfamiliar with the element 'ago' which needed changing into 'before' in the indirect speech, thus, Q4 was answered least correctly and relocated as Level 4 in the revised Construct Map.

Such findings, though, were different from other research, when the Construct Maps showed good alignment with the results of the Rasch Analysis (Rittle-Johnson *et al.*, 2011). This difference was due to the consideration of students' levels when dividing the content into levels. Notice that the present study focused on a sole grade and sought to divide the content corresponding to the various levels of the students in that grade as well as to create intervention to foster learning accordingly, which was more specific and student-oriented. Therefore, the Construct Maps of this report were different from the Construct Maps created in accordance with the sequence of teaching and the level of difficulties in textbooks.

Nevertheless, the comparison with the Wright Maps generated from the Winsteps allowed discovery of differences. Consequently, the initial missing factors that affected students' learning could be discovered and included in the revised Construct Maps for the interventions and the second tests followed. The comparison also raised awareness of the researcher to have more

in-depth consideration and selection of the factors when establishing the Construct Maps in Cycle One and Cycle Two. Therefore, higher alignment and less difference could be found in the comparison between the Construct Maps and the results of the Rasch Analysis in the aforementioned cycles. In fact, the Construct Maps could reflect more closely the hierarchies of the English grammar content in related to the students' levels.

Research Question 2

Vygotsky (1978) claimed the importance of locating the ZPD of the students as it helped teachers be aware of the future learning needs of them. Additionally, Stiggins (2005) emphasized the location of the students' mastery during the intervals of the learning process by enabled teachers to make instructional adjustment to enhance learning and helped students to understand their learning progress and the gap between so as to develop strategies to bridge it.

In addition to checking the hierarchies of grammar content, the enquiry of the preliminary tests was aimed at locating the learning progression of the students as well as foreseeing their future learning goals. Yao and Mok (2013) stated that by applying the Rasch Analysis where the examinees' abilities were located in accordance with the item difficulties, teachers could obtain information of the ZPD which was important the diagnostic information for formative assessment to inform future learning goals so as to optimize learning outcomes.

The results of such analysis were later compared with the Construct Maps so that students' current progression was supported with clear description. As Wilson (2009) stated, such comparison helped to locate the current progression of the students and provide diagnostic information of misconception for teachers. Thus, teachers could provide aids and instructional assistance accordingly.

Findings from the semi-structured interviews showed students had higher opinions on the intervention than students which ZPDs were not located. When asked for their perspective on the intervention, students in the experimental groups welcomed the intervention and claimed to have better understanding through practices. Additionally, the number of the exercises was not overwhelming. They revealed higher motivation of accomplishing exercises which were not assigned to them or were more difficult for them when responding to the sub-question whether they would finish all the exercises.

The explanation of this positive opinion was because the intervention was tailored to answer their learning needs and students were supported directly. As a result, they were more motivated to fulfill the tasks and seek help from teachers when necessary. A further explanation was that students were required to fulfill tasks of their levels and were not made to cope with materials too easy or too difficult for them, which made them see themselves as capable learners (Black and William, 2010).

Negative perspective could be observed when the location of learning procession was absent, thus, the follow-up assistance was not well accepted by the students of various levels. For the

students who were more proficient, they regarded those exercises as unnecessary or a waste of time while the less able students were unwilling or even frustrated to do more exercises. This probably occurred, as students' needs were not answered since the able students were made to practice the content they had already mastered and, their knowledge and skill was not further developed. Simultaneously, the students with slower progress were constantly made to deal with content beyond their current ability and experienced repetitive failure, which made them unsuccessful learners and ceased to make effort.

Research Question 3

The findings reflected decreases in the results of the second tests in Cycle One and Two though significant improvement in the second tests was noticed in students of the Pilot Study. Such decline in results showed the insignificant progression in English teaching and learning in Macao, that is, students only used English in English lessons and the language was forgotten in others in Chinese-medium schools in Macao (Young, 2009). In Cycle One, the simple past and the past continuous tense and the reported or indirect speech in Cycle Two were found more difficult for students. Probably, more frequent tests in the intervals of learning might have needed as indicated by Owen (2016). Therefore, the results of the second tests were not as desirable as those in the Pilot Study.

However, it can be observed there were smaller gaps between the results in the preliminary and second tests in the experimental groups. Such findings indicated the intervention-mediated decline in learning. Nevertheless, the findings in semi-structured interviews indicated the intervention had positive impacts on students' learning.

First, students in the experimental groups demonstrated proactive learning strategies to answer their learning needs. They would pay more attention to the mistakes they had made previously in the preliminary tests and exercised higher caution when doing similar questions in the second tests. Furthermore, they would examine their mistakes, reflect what they could not master yet and devote more effort to that area. They also tried applying the grammar rules to the second test for better results.

Second, higher receptivity of additional exercises and motivation in learning were found in those students. They would accept extra work and welcome additional exercises as the result of the higher expectation in the intervention. Students echoed assurance of the necessity and the effectiveness of the intervention when expressing their perceptions on the intervention. They stated they had better understanding of the learning contents and were more confident about their answers as they developed the habit of applying the grammar rules to look for indicators. They also utilized the intervention as revision or pre-tests for the second tests.

Finally, they showed high expectation in the results of the second tests. Despite the fact that students from both groups expected higher results in the second tests, students in the experimental

groups referred the improvement to the intervention and the effort they had made through accomplishing the intervention.

On the contrary, negative comments for the assigned exercises like unnecessary or not helpful were found in the control group. The capable students of that group had high belief in their ability and concluded the better results in the second test as their own understanding of the learning content. Simultaneously, the students with lower ability remained confused at the completion of those exercises. They simply thought they would have bad results again and did not show motivation in taking action to improve.

These findings can be explained that the students in the experimental groups were taken the intervention as feedback of their learning progression as well as available guidance to help them achieve the sequent learning goal (Owen, 2016). Therefore, they were provided opportunity to close the gap between their present progress and the next learning goals (Juwah *et al.*, 2004). The intervention as useful feedback also involved students as the active users of them (Black and William, 2010) and thus, they became more accountable for their own learning and more willing to take risks rather than worrying about the final scores (Owen, 2016), which was the reactions of the less able students in the control groups. The repeated failure when doing exercises beyond their competence also resulted in lower self-esteem and emotion consequences of those students seeing themselves as less capable learners (Black and William, 2010). Consequently, they simply did not believe they could improve or achieve desirable learning results.

Research Question 4

In the findings of the first research question, it can be noted that the initially established Construct Maps differed from the results of the Rasch Analysis in terms of the hierarchies of the English grammar topics. For the content considered manageable was found difficult for the students. Additionally, missing factors or elements hampered students' answering the questions correctly. Those differences were because the Construct Maps created in this present study were more student-oriented. They were established in accordance with the learning levels of the students involved in the study instead of the sequences or the levels instructed in textbooks. However, findings from the research diary showed that such difference could be lessened when lists of factors or elements were grouped and eliminated based on their influences on students. Factors or elements that had the same effects on the students could be grouped and placed on the same level. While groups of factors and elements affecting students, the least were placed in the lowest level and eliminated for the higher levels, others with greater influence could be found and placed in the next level. In this way, the various levels of the learning content could be discovered and allocated in the Construct Maps accordingly. Thus, more alignment in the Construct Maps and the results of the Rasch Analysis could be found in Cycle One and Cycle Two as mentioned previously when addressing Research question 1.

Findings for Research questions 2 and 3 also indicated that teaching and learning assistance should be tailored to cater for the various needs of the students in order to foster the learning outcomes. The students in the experimental groups who were given exercises addressing their needs and current learning progression responded overwhelmingly positive perspective on the intervention and higher motivation in accomplishing the given exercises. They considered themselves as capable learners and were made to involve in their own learning. Therefore, they took proactive learning strategies to close the gaps between their present progress and the next learning goals (Juwah *et al.*, 2004).

OTHER FINDINGS

It was also discovered in the reflection of the research diary that intervention was given to students to consolidate their understanding and to answer their future learning needs. Therefore, students should be assigned exercises of their present level and the level they were able to manage if provided with assistance (Vygotsky, 1978). Students who were given intervention of lower hierarchies were noted unsecured when preparing for the second tests, though they still felt confident in achieving better results when addressing the second research questions.

In addition, it was noticeable that nine out of the twelve tasks involved in the application of IRT were done during the school hours and could be integrated in the daily teaching routine. Moreover, it was noted that the overall manipulation of the Winsteps software was manageable. The time for computerizing the results of the 87 students in the preliminary tests and inputting data for the Rasch analysis required 42 minutes in average and were done during the school hours. The researcher only confronted difficulties when adjusting the display of the Wright Map, which consumed additional time in search of the specification needed by the software. Such findings agreed with researchers that the Rasch Model was more comfortable to work with and that the Rasch Model analysis can be implemented with the Winsteps software, designed in accordance with the theory of the Rasch Model (Linacre, 2011), which makes the whole application more feasible for users (Yao and Mok, 2013).

LIMITATIONS OF THIS STUDY

There are some limitations of the present analysis, including:

- The study only involved students from one Chinese-medium secondary school in Macao. Consequently, the findings may not be generalized beyond the context of the study.
- The limited number of items in each test prevented in-depth examination of the effectiveness of the intervention. The duration for intervention ran for only one week, which may not be sufficiently long to maximize the effectiveness of it.
- The researchers did not have complete control in the arrangement of tests as school announcement might emerge, which caused postpone of tests and affected the performance of the students.

- There was a lack of in-depth responses in semi-structured as the result of limited available time for the interviews. Some of the interviews were conducted after school when the students wished to leave, thus, some of them gave hasty and brief responses.
- The questions for the semi-structured interviews were only three with limited number of sub-questions, which may not allow in-depth investigation of the participants' perspective on the intervention.
- The study focused on the perception on the intervention and did not measure other factors, such as motivation, self-esteem and the relationship with the teachers, which may also cause the influence on the learning outcomes.
- The data generated from the research diary contained subject perspective though objective data were collected (e.g., the time involved in the implementation).

RECOMMENDATIONS FOR TEACHERS

Emerging for this present study are several strategies that can be effective and efficient for English teachers in Secondary schools to promote learning through the implementation of IRT:

- Plan and establish the Construct Map of the learning content carefully. Learning contents should be listed completely and later located into different hierarchies based on their difficulties. Elements or factors that may affect student's mastery should be grouped and allocated into different levels in the Construct Map followed by precise description. A Construct Map is a guidance to examine what should be taught and evaluated. By listing the contents in various levels, it provides instructional procedures and a checklist for teachers.
- Test items must be designed in accordance with the established Construct Map. Evaluation ensures what needs to be taught is actually taught. Thus, there must be a match between the teaching content and the assessment. Additionally, alignment between instruction and assessment helps locate the current progression of the student. Therefore, test items must be designed following the precise description of each level. In this way, the answers of the students for certain items can be utilized to inform their current learning progression and so, teachers can provide support accordingly.
- The Rasch Model analysis is helpful to map the understanding of vast number of students and help to examine the Construct Map. Though the location of students' current progress can be done through the comparison of the Construct Map (Wilson, 2003, 2004), the use of Winsteps is more efficient and accurate. The comparison can be done directly by vision. Though it may require time and effort to computerize the test scores, the accuracy of the location outweighs the investment. These results can also be used to scrutinize the Construct Map to improve the following support for the students.

- Additional backing must be tailored to answer the need of the students. Students of various levels can be grouped and different teams should be instructed and supported differently. Homogenous and heterogeneous grouping can be adapted based on the choice of the teachers. Grouping students with same level of ability can avoid comparison while teachers can provide support easily to answer their need. On the other hand, heterogeneous grouping helps students to learn from their peers to allow cooperative learning when the role of the teachers changes from instructor to facilitator (Webb, 2000).
- Keep in mind that additional support is not only provided to consolidate the students' current learning progression but to answer the future learning needs of the students. While revision and consolidation of students' current progress is necessary, students should also be given instruction of the next level. If there are additional exercises, items of various levels should be available for students of different levels. Although the assignment of exercises can be varied to cater for their needs, students can have further practices if they wish.
- Assessment must be done regularly to obtain information of the students' understanding followed by learning support. The number of tests must be considered at the time of instruction. While more tests can be given for more complicated and difficult content, the number of tests can be lessened for simple content. After each test, students must be given support to promote understanding to avoid repeated failure and negative psychological effects caused.
- Teachers should promote positive learning atmosphere and encourage students to raise motivation and self-esteem. The core belief of formative assessment is everyone can succeed (Black and William, 2010). Teachers should celebrate the success of students in each learning progress and emphasize their improvement. Also, they should help them realize their next learning goals by providing feedback of what should be done next.
- Collaborative teaching can be applied to share the workload. While the implementation of IRT and formative assessment involves more effort and time, the burden can be shared if teachers are working as a team (Lee, 2007). Tasks can be divided so that less time and effort will be needed from each in the team. Moreover, members can be assigned into groups of students to provide support and assistance simultaneously.

REFERENCES

- Black P and William D, 2010. Inside the black box: raising standards through classroom assessment. *Phi Delta Kappan*, Vol. 92, No. 11, pp. 81-90.
- Cohen L, Manion L, Morrison K and Wyse D, 2010. A guide to teaching practice (Revised 5th edition) Abingdon, UK: Routledge.
- DSEC, 2016a. Demographic statistics. Retrieved on 28 July 2016, https://www.dsec.gov.mo/ Statistic.aspx?NodeGuid=7bb8808e-8fd3-4d6b-904a-34fe4b302883.

- DSEC, 2016b. Macao in figures. Retrieved on 28 July 2016, www.dsec.gov.mo/ Statistic.aspx?NodeGuid=ba1a4eab-213a-48a3-8fbb-962d15dc6f87.
- DSEJ, 2016. Educational statistic. Retrieved on 2 August 2016, from portal.dsej.gov.mo/ webdsejspace/ internet/Inter_main_page.jsp?id=8525.
- Heydari P, 2015. Item Response Theory (IRT): state of the art. *Modern Journal of Language Teaching Methods* (MJLTM), Vol. 5, No. 1, pp. 134–144.
- Ho U Kei, Monteiro E and Negreiros J, 2018. Implementation of Item Response Theory to English grammar assessment to foster learning. *International Academic Conference on Global Education, Teaching and Learning*, ISBN 978-80-88203-07-0, pp. 30-36, Budapest, Hungary.
- Juwah C, Macfarlane-Dick, D, Matthew B, Nicol D, Ross D and Smith B, 2004. Enhancing student learning through effective formative feedback. New York: The Higher Education Academy (Generic Centre).
- Lee I, 2007. Assessment for learning: Integrating assessment, teaching, and learning in the ESL/EFL writing classroom. *Canadian modern language review*, Vol. 64, No. 1, pp. 199-213.
- Li L and Luo S, 2014. Development and validation of a test measuring language analytic ability for Chinese learners: A Rasch-based pilot study. *Chinese Journal of Applied Linguistics*, Vol. 37, No. 2, pp. 194–212.
- Linacre JM, 2011. A user's guide to Winsteps/Ministep Rasch-model computer program. Chicago, IL: Winsteps.com.
- MSAR, 2016. Geography and population geographical location. Retrieved on 28 July 2016, from www.gcs.gov.mo/files/factsheet/geography.php?PageLang=E.
- Owen L, 2016. The Impact of feedback as formative assessment on student performance. *Executive Editor*, Vol. 28, No. 2, pp. 168-175.
- Rittle-Johnson B, Matthews PG, Taylor RS and McEldoon KL, 2011. Assessing knowledge of mathematical equivalence: A construct-modeling approach. *Journal of Educational Psychology*, Vol. 103, No. 1, pp. 85–104. https://doi.org/10.1037/a0021334
- Sansom D, 2016. English language education in Macau schools. Retrieved on 26 March, 2017, from www.academia.edu/29665235/English_language_education_in_Macau_schools.docx.
- Shan PWJ and Leong SSL, 2008. Post-colonial reflections on education development in Macau. *Comparative Education Bulletin*, No. 11, pp. 37–68.
- Stiggins R, 2005. From formative assessment to assessment for learning: A path to success in standards-based schools. *Phi Delta Kappan*, Vol. 87, No. 4, pp. 324-328.
- Taylor R, Rittle-Johnson B, Matthews P and McEldoon K, 2009. Mapping children understands of mathematical equivalence. Paper presented at the Society for Research on Educational Effectiveness (SREE 2009), Crystal City, USA.
- Vygotsky LS, 1978. Interaction between Learning and Development. In: Cole M, John-Steiner V, Scribner S and Souberman E (Eds.), *Mind and Society: The Development of Higher Psychological Processes* (pp. 79-91). Cambridge, MA: Harvard University Press.
- Wei G, 2017. Learning by expanding: An activity-theoretical approach to developmental research. *Frontiers of Education in China*, Vol. 12, No. 1, pp. 130–132.

Wilson M, 2003. On choosing a model for measuring. <i>Methods of Psychological Research</i> , Vol. 8, pp 1–22.
Wilson M, 2004. Constructing measures: An item response modeling approach. Routledge.
Wilson M, 2009. Measuring progressions: assessment structures underlying a learning progression Journal of Research in Science Teaching, Vol. 46, No. 6, pp. 716-730.
Wong K, Negreiros J and Neves A, 2016. The teaching of computer competences with cooperative learning in Macao: Working in Progress. <i>International Journal for Digital Society</i> , ISSN 2040- 2570, Vol. 7, No. 3, pp. 1185-1192.
Yao J and Mok M, 2013. Implementing assessment for learning: an application of the Rasch model for the construction of a mathematics assessment to inform learning. Assessment and Learning Vol. 2, pp. 29–50.
Young M, 2007. English in postcolonial Macau: functions and attitudes. <i>Asian English</i> , Vol. 10, No 1, pp. 104–117.
Young M, 2009. Multilingual education in Macao. <i>International Journal of Multilingual</i> , Vol. 6, No 4, pp. 412–425. doi.org/10.1080/14790710802152438.

Young M, 2011. English use and education in Macao 1. In English language education across Greater China, Vol. 80, pp. 114–130. Bristol: Multilingual Matters.



Appendix

Wright map of the preliminary test for Simple Present and Present Continuous Tense (Pilot Study)

Wright map of the												S	Studen	ts - M.	AP - It	ems
for Simple Past	81	0				D04	D05	D06	D09	D11	D17	D19	G15 G08	G20 -	+ 	
and Past Continuous Tense														s		
(Experimental	70	0 C10	D07	D14	G01	G03	G04	G07	G09	G13	G14	G16	G17	G18	Q10	
Groups: Cycle One)	61	0				C06	D08	D10	D12	D13	D16	D18	G12	G19 M	 S + 07	
	_					C01	C07	C08	D01	D02	D15	G02	G06	G 1 1	Q6	Q8
	50	0						C03	C04	C11	C13	D03	D20	G05 S	Q3 M Q4	
														G21	09 05	
	40	0											C05	C12 T	 	
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(Experimental Croups: Cycle Two)	80														+	
Groups: Cycle 1wo)	70 /	A02 A0	I3 A05	A07	A11	A14	A15 A	16 A1	8 F03	G01	G06	G07	G08 G	09 G15	si is +	
	60									AU9	A21	A04 .	A10 A	14 G17	н 09 м 04 07	
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A Study on Academic Stress among D.El.Ed. Students of Ghaziabad District

Anurag Sharma

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ABSTRACT

Academic stress among students have long been researched by several investigators and they have identified stressors as too many assignments, competition with other students, failures, lack of pocket money (Fairbrother and Warn, 2003), and poor relationships with other students or lecturers and family problems at horn. Institutional level stresses are overcrowded lecture halls (Ongori, 2007; Awino and Agolla, 2008), semester system, and inadequate resources to perform academic work. Stress and its manifestations, such as anxiety depression, and burnout, are always a common problem among people in different professions and occupations. In the last few decades, alarm has already been provoked by the proliferation of books, research reports, popular articles, and the growing number of organized workshops, aiming to teach people how to cope with this phenomenon. The purpose of the study is to find out the level of academic stress among D.El.Ed. Students. The present study consists of 200 D.El.Ed. Students studying in Government and private teach training colleges situated in District of Ghaziabad, India. The sample was selected by using sin random sampling technique. The present study reveals that the male students' academic stress is higher than the female students. The urban students' academic stress is higher than the rural student. The Government students' academic stress is less than private school students.

Keywords: Academic stress, D.El.Ed. Students, Male/Female, Urban/Rural, Government/private

INTRODUCTION

Stress is viewed as a negative emotional, cognitive, behavioral, and physiological process that occurs as a person tries to adjust to or deal with stressors (Bernstein *et al.*, 2013). Stressors are denned as circumstances that disrupt, or threaten to disrupt, individual's daily functioning and cause people to make adjustments (Auerbach and Grambling, 2008). The following list contains some of the common warning signs and symptoms of stress. The more common signs and symptoms one may notice in himself, the closer he may be to stress overload: Inability to concentrate, moodiness, irritability or short tempered, poor judgment, agitation, inability to relax, seeing only the negative, feeling overwhelmed, anxious or racing thoughts,

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sense of loneliness and isolation, constant worrying, depression, or general unhappiness are the general symptoms. The physical symptoms are aches and pains, eating more or less, diarrhea or constipation, sleeping too much or too little, nausea, dizziness, isolating himself from others, chest pain, rapid heartbeat, neglecting responsibilities, frequent colds, using alcohol, cigarettes, or drugs to relax, nervous habits (e.g., nail biting, rearing, preening, and other stereotypes). The signs and symptoms of stress can also be caused by other psychological problems.

Important sources of stress are the frustration, conflict, pressure, and anxiety. Frustration is a feeling of discomfort, disappointment, or insecurity aroused by gratification or by the existence unresolved problems. Children and adults with developed disabilities often experience frustration in academic, vocational, and social situation because they are frequently unable to reach the expectations and desires of others. Conflict is often sparked by a clash of interests, actions, or directions. It refers to the existence of that clash. Psychologically, a conflict when the reduction of one motivating stimulus involves an increase in another, and that exists us to suffer in the future unless it is managed constructively. When associated with violence, destruction and killing, the conflict is no longer a healthy part of living. Pressure is the application of continuous force by one person on another which is emotionally touching. Pressure is a competing or constraining influence on the mind or will. A limited pressure is good as it drives one to work in the desired direction. But an ice of pressure of anything is harmful for us as it causes extreme stress. Anxiety is the conditioned (learned) fear for a non-fearful object. A normal level of anxiety has a motivating property for the desired action, such as anxiety for passing the examination. In post-optimum quantity, it causes muscular freezing due to emotional confusion and results into non-activity.

Effects of Stress

It has been argued that an individual can have possibly anxious thoughts, difficulty to concentrate or remember because of being stressed. Stress can also lead to change in people's behaviors, such as nail biting, heavy thing, teeth clenching, and hand wringing. If people are stressed then they may feel cold hands and feet, butterflies in stomach, and sometimes, increased heart rate, which all are regarded as common physiological effects of stress, which can be connected to emotion of anxiety (Auerbach and Gramling, 2008). Physical and psychological responses to stress generally occur together, principally when stressors become more intense. However, one category of stress responses can influence other responses. For instance, mild chest pain may lead to the psychological stress response of worrying about getting a heart attack. Physical responses can be when a person escapes from a terrible accident or some other frightening events, he or she will experience rapid breathing, increased heart beating, sweating, and even shaking little later. These reactions are part of a general pattern known as the fight-or-flight syndrome. The psychological responses to stress can appear as changes in emotions, thoughts (cognition), and behaviors (Bernstein *et al.*, 2013).

Academic Stress

The definition of academic stress is the anxiety and stress that comes from schooling and education. There is often a lot of pressure that comes along with pursuing a degree and one's education. There is studying, homework, tests, labs, reading, and quizzes. Academic stressors include the student's perception of the extensive knowledge base required and the perception of an inadequate time to develop it (Carveth *et al.*, 2006).

Review of Related Studies

Deb et al. (2014) studied on stress among private school students in India. The purpose of this study was to examine the prevalence of academic stress and exam anxiety among private school students in India as well as the associations with socio-economic and study-related factors. Participants were 400 adolescent students (52 percent male) from five private schools in Kolkata. Findings revealed that 35 and 37 percent students reported high or very high levels of academic stress and exam anxiety, respectively. All students reported high levels of academic stress, but those who had lower grades reported higher levels of stress than those with higher grades. Bataineh (2013) studied on Academic stress among undergraduate students: the case of education faculty at the King Saud University. This study investigated the academic stressors experienced by the students at the university. A total sample of 232 subjects participated in this study. Data were collected through self-administered questionnaire, which was randomly distributed to the students during lecture time. Data obtained were analyzed using descriptive statistics, correlation, and analysis of variance. The result showed that academic overloads, course awkward, inadequate time to study, workload every semester, exams awkward, low motivation, and high family expectations were drive moderately stress among students. It was also found that fear of failure is the major source of stress among undergraduate students. The study examined the impact of academic stress among the management students. Stress management encompasses techniques to equip a person with effective coping mechanisms for dealing with psychological stress. Students have different expectations, goals, and values that they want to fulfill, which is only possible if they are integrated with that of the institution. Scholars (Ornelas and Kleiner, 2003; Verment and Steesma, 2005; Ongori, 2007; Topper, 2007; Ongorfi and Agolla, 2008; Agolla, 2004) for instance have notified the symptoms and the causes of stress in work environments as sitting for a long period of time, poor work performance, poor interpersonal relationships, inadequate and lack of resources, inadequate time to perform particular assignment, poor working conditions, overcrowded work stations, excessive paperwork, and many others. Researchers (Ongori and Agolla, 2008; Agolla, 2004) have long identified stress symptoms as lack of energy, taking over the counter medication, high blood pressure, feeling depressed, increase in appetite, trouble in concentrating, restlessness, tensions, and anxiety among others.

Need and Significance of the Study

In today's highly competitive world, students face various academic problems including exam stress, disinterest in attending classes, and inability to understand the subject. Academic stress

is the feeling of anxiety or apprehension over one's performance in the academic activities. It can lead to students being unable to perform to the best of their abilities in examinations. In Teacher Training colleges, there is a range of academic pressure feel, derived from a need for perfection, worry over grades, parental pressure, competition, sports, or a tough class load. The nervous breakdowns, panic attacks, burnouts, and depression are also apparent in many D.El.Ed. students. The same situation is not always stressful for all people, and all people do not undergo the same feelings or off-putting thoughts when stressed. Students of Teacher Training colleges were considered to be the future pillars who take the responsibilities to take our country to the next phase, hence, they should be in better way. To know this, the investigator decided to analyze the academic stress among D.El.Ed. students of Teacher Training colleges.

STATEMENT OF THE PROBLEM

The problem under taken by the investigator is stated as Study on Academic Stress among D.El.Ed. students of Ghaziabad District.

OBJECTIVES OF THE STUDY

The investigation of the present study framed the folio objectives:

- 1. To find out the level of academic stress among D.El.Ed. Students of Ghaziabad District.
- 2. To find out whether there is significant difference between the following sub-samples with respect to academic stress.
- a) Gender [Male/Female]
- b) Locality [Rural/Urban]
- c) Management [Government/Private]

HYPOTHESES OF THE STUDY

The investigator of the present study framed the following hypotheses:

- 1. There is significant mean difference between male and female D.El.Ed. students with respect to academic stress.
- 2. There is significant mean difference between rural and urban area D.El.Ed. students with respect to academic stress.
- 3. There is significant mean difference between Government and Private school D.El.Ed. students with respect to academic stress.

VARIABLES

Independent Variables

- a) Gender (Male/Female).
- b) Locality (Rural/Urban)

c) Management (Government/Private)-Dependent variable: Academic stress of BC students.

The Method

In the present study, the investigator applied normative survey as a method. The normative survey method studies, describes, and interprets what exists at present.

Sample

A sample is a small proportion of a population selected for observation and analysis. By observing the characteristics of the sample, one can make certain inferences about the characteristics of the population from which it is drawn. The present study consists of 200 D.El.Ed. students studying in Teacher Training colleges of Ghaziabad District, India. The sample was selected by using simple random sampling technique. The sample forms a representative sample of the entire population.

Tool Used

To measure Academic stress of D.El.Ed. students, the investigator selected and used the Abha Rani Bist Battery of stress Scales. This battery is published by National Psychological Corporation, Agra. This scale consists of 13 subtests, which measures four components of stress-frustration, conflict, pressure, and anxiety of adolescent students.

Statistical Techniques Used

For the analysis of the data, the following statistical techniques have been used.

- a. Descriptive analysis (Mean and S.D.) and
- b. Differential analysis ('t' test)

Testing of Hypotheses

Table 1: Showing the mean and standard deviation of academic stress scores of D.El.Ed. students

Variable	Sample	N	Mean	S.D.	<i>t</i> -value	Significant at 0.05 level
Gender	Mal	100	37.98	10.33	0.10	Not Significant
	Female	100	39.31	9.71	0.10	
Locality	Rural	100	38.69	7.10	0.82	Not Significant
	Urban	100	39.97	9.20	0.82	
Management	Government	100	37.72	9.23	0.33	Not Significant
	Private	100	36.15	9.12		
	-					

Anurag Sharma



Graph 1: Mean and standard deviation of academic stress scores of D.El.Ed. students

FINDINGS

The following are the main findings of the present investigation.

- 1. The D.El.Ed. students are having moderate level of academic stress, and irrespective of sub-samples of the D.El.Ed., students are having moderate level of academic stress.
- 2. Male and female D.El.Ed. students do not differ significantly in their academic stress scores.
- 3. Rural and urban area D.El.Ed. students do not differ significantly in their academic stress scores.
- 4. Government and private college D.El.Ed. students do not differ significantly in their academic stress scores.

CONCLUSION

The present study reveals that the D.El.Ed. students are having moderate level of academic stress, and irrespective of sub-samples of the D.El.Ed., students are having moderate level of academic stress is higher than female student. The urban students' academic stress is higher than rural students. The Government College D.El.Ed. students.

EDUCATIONAL IMPLICATIONS

The result of the study shows that the level of D.El.Ed. students of Teacher-Training colleges about academic stress, being in touch with daily lessons is a good idea. Try to be regular in attending and concentrating in lectures. Last minute studying should be avoided and remember that a regular seven hours of sleep is mandatory for the body to function well. One should identify the best time and place for studying and this varies with each individual. The students are aware of the exact topics that are going to come for the exams and previous year's question papers should give you an idea about the exam pattern. Taking regular short breaks while working helps one to relax and concentrate for longer. One should always set 'realistic' goals in life and never let negative thoughts get into one's mind. On the day of the exams, one should remain calm and stop being nervous.

REFERENCES

- Agolla, 2004. Occupations stress among Police Officers. The case of Botswana Police Service, *Research Journal of Business Management*. Vol. 2, No. 1, pp. 25-35.
- Auerbach MS and Grambling SE. Stress Management Psychological Foundations. U.S.A.: Prentice-Hall, Inc., 2008.
- Awins R and Angola K, 2008. A Quest for sustainable quality assurance measurement for universities. Case of study of the University of Botswana. *Educational Research and Review*, Vol. 3, No. 6, pp. 213-218.
- Bataineh MZ, 2013. Academic stress among undergraduate students: the case of education faculty at King Saud University. *International Interdisciplinary Journal of Education-January 2013*, Vol. 2, No. 1, pp. 82-88.
- Carveth JA, Gesse T and Mosa N, 2006. Survival strategies for nurse-midwifery students. *Journal of Nurse-Midwifery*, Vol. 41, No. 1, pp. 50-54.
- Deb, Sibnath, Strodl E and Sun J, 2014. Academic-related stress among private secondary school students in India. *Asian Education and Development Studies*, Vol. 3, No. 2, pp. 118-134.
- Fairbrother B and Warn T, 2003. Workplace dimensions. Stress and Job Satisfaction. *Journal of Managerial Psychology*. Vol. 18, No. 1, pp. 8-21.
- Ongori K, 2007. A Review of the Literature on employee Turnover. African Journal of Business Management, Vol. 3, pp. 49-54.

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