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Spectral & Biological Characterization of Zirconyl Complexes of a Pyrazolone-ß-Diketo Hydrazone Ligand

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Two zirconyl complexes, [ZrO (AAPAAC)$_2$(NO$_3$)$_2$] & [ZrO (AAPAAC)$_2$Cl$_2$], where (AAPAAC = 1,2-dihydro-1-phenyl-2,3-dimethyl-4-[2',4'-pentanedione-3'-hydrazono] pyraol-5-one were synthesized and characterized by physico chemical and spectroscopic methods. The intramolecularly hydrogen bonded hydrazone structure of the ligand, AAPAAC was confirmed by spectral studies (IR, NMR & Mass). The magnetic susceptibility measurements and low conductance data provide evidence for the monomeric and non-electrolytic natures of the complexes respectively. Thermal study of the complexes reveals their stability and anhydrous nature. The ligand shows neutral bidentate behavior in the complexes and the spectral studies confirm an octahedral geometry around the [ZrO]$^{2+}$ in all the complexes. The ligand and its complexes were screened for their antibacterial activities using disc diffusion methods.

Keywords: 4-Aminoantipyrine, Acetyl acetone, Hydrazone and Antibacterial.

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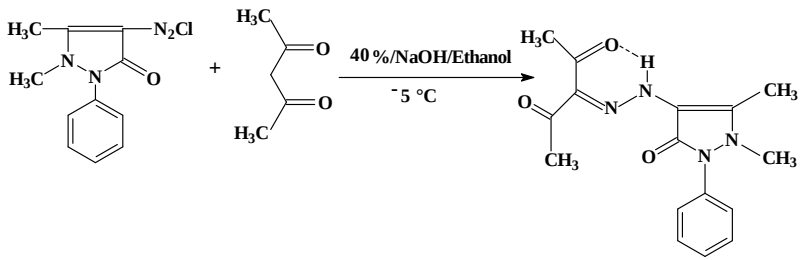
Introduction

The chemical properties of hydrazone and their complexes are widely explored in recent years, owing to their coordinating ability, pharmacological activity and their use in analytical chemistry as metal extracting agents[1-6].There are various applications of the aroyl hydrazones which depend upon their structural characteristics[7,8]. Due to the electron donating capacity of hydrazones, certain aroyl hydrazones act as inhibitor to prevent the corrosion of copper metal in the presence of nitric acid[9,10]. β -dicarbonyl complexes undergoes diazocoupling at the reactive methylene group and the resultant product exist in intramolecularly hydrogen bonded hydrazone form[11]. Complexes of these type of ligands have been reported and in complexes they may exist as either azo or hydrazo form[11,12]. Here with we are reporting the Zr(IV) complexes of this type of ligand, AAPAAC and here also AAPAAC retains its hydrazone structure when complexed to Zr(IV).

Synthesis

Synthesis of 1,2-dihydro-1-phenyl-2,3-di methyl-4-[2',4'-pentanedione- 3'-hydrazono]pyrazol-5-one (AAPAAC)

The hydrazone, AAPAAC was prepared by the coupling of acetylacetone with diazotized 4-aminoantipyrine as reported earlier following Japp-Klingemann procedure[11] (Scheme 1) 4-Aminoantipyrine (10.15 g, 50 mmol) was dissolved in 20 ml of ethanol by vigorous stirring and diazotized using $NaNO_2$ (5 g, 72 mmol) and 10 ml of 1:1 HCl by maintaining the temperature below 5 °C. The resulting diazonium salt solution was added slowly with stirring to an ice-cold alkaline solution of acetylacetone (6 ml, 60 mmol) dissolved in 15 ml of 40% NaOH. This mixture was kept in an ice bath for 30 minutes with occasional stirring. Bright shining yellow crystals separated were filtered, washed with petroleum ether and finally with a small amount of water. The product was recrystallised from hot methanol. Melting point is 179 °C. Yield: 80%.



Scheme 1

Synthesis of zirconyl complexes

About 1 mmol of the metal salt [$ZrOCl_2$. $8H_2O$, 0.322 g; $ZrO(NO_3)_2.H_2O$,0.341 g] was dissolved in methanol. To this a methanolic solution of the ligand (2 mmol, 0.638 g) was added when an instantaneous color change was observed in all the cases. The solution was refluxed for 5-6 h for the completion of the reaction. Solid complexes separated on slow evaporation of the solution were filtered, washed first with benzene and then with ether to remove excess ligand if any and dried over P_4O_{10} under vacuum.

Experimental

Microanalyses of the compounds were done with an Elemental Vario EL III CHN elemental analyzer. Room-temperature FT-IR spectra were recorded as KBr pellets with a JASCO FTIR 4100 Spectrophotometer in the 4000-400cm^{-1} range. The electronic spectra were recorded on a Cary 5000 Version 1.09 UV-VIS-NIR Spectrometer in the range 900-200 nm in methanol solutions. ^1H NMR Spectra of the ligand and complexes were recorded in DMSO-d_6 on a Bruker Avance DRX 500 MHz NMR Spectrometer. The molar conductances of complexes in methanol (10^{-3}M) solutions at room temperature were recorded using a Systronics 303 direct reading conductivity meter. The magnetic susceptibility measurements of the complexes were measured using a Sherwood Scientific magnetic susceptibility balance at room temperature by Gouy method using Hg [Co (CNS)$_4$] as calibrant. The thermal studies were recorded on a Mettler TG-50 thermobalance with 20 °C/min. in nitrogen atmosphere at NIIST, Thiruvananthapuram. The 3D molecular models of the complex, [ZrO (AAPAAC)$_2$Cl$_2$],has been constructed by using the Modeling and Analysis Software CHEM BIO 3D Ultra 11.0 [12].

Results and Discussion

The partial elemental analyses data and molar conductivities of the complexes are listed in Table 1. The elemental analysis data of the zirconyl complexes are consistent with their general formulation of the type ML_2X_2, where M = ZrO, L = AAPAAC and X = NO_3^- or Cl^-. The complexes are non-hygroscopic in nature and soluble in acetonitrile, methanol, ethanol, DMF and DMSO.

The low conductance values (in the range 0-18 ohm^{-1} cm^2 mol^{-1}) observed for the 10^{-3} M solutions of complexes in methanol and DMSO suggest non-electrolytic behavior of the complexes.

The magnetic susceptibility of the complexes was found to be negative indicating the complexes are diamagnetic as expected for the $4d^0$ $5s^0$ state of the Zr (IV).

Table - 1
Analytical data and physical data for AAPAAC and its oxometal complexes

Composition % Found (Calc) λ_m ($ohm^{-1}cm^2mol^{-1}$)

Compound	Color	Composition % found(calc)			λ_m [a]	μ_m [b](B. M)
		Carbon	Hydrogen	Nitrogen		
AAPAAC	yellow	61.26 (61.13)	5.71 (5.77)	17.72 (17.82)	-	-
$[ZrO(AAPAAC)_2Cl_2]$	Blackish brown	47.63 (47.64)	4.59 (4.57)	13.87 (13.89)	6	-
$[ZrO(AAPAAC)_2(NO_3)_2]$	Brown	44.74 (44.76)	4.21 (4.22)	16.29 (16.29)	6.8	-

[a]Molar conductivity, 10^{-3} M methanol at 298 K.
[b] Magnetic susceptibility per metal atom.

Infrared Spectra and Bonding

The IR spectral bands of the ligand, AAPAAC and its zirconyl complexes along with their probable assignments are given in Table 2. Presence of a medium broad band at 3317 cm^{-1} due to the NH stretching and a medium strong band at 1630 cm^{-1} (strongly hydrogen bonded -C=O) in the spectrum of AAPAAC and complexes strongly favours the existence of the intramolecularly hydrogen bonded hydrazone form of the ligand AAPAAC[11] . A strong band at 1720 cm^{-1} indicates the presence of free carbonyl group of the acetylacetone moiety and the presence of this band without much shift in the complexes shows the non-participation of the free -C=O in metal coordination [11,12,13]. This again confirms the existence of the same structure of AAPAAC in metal coordination.

A strong band at 1664 cm^{-1} in the spectrum of AAPAAC can be assigned to the pyrazolone -C=O and the band at 1617 cm^{-1} is attributed to the azomethine group present in the ligand [11, 14,15, 16, 17]. In the spectra of complexes, υC=O (pyrazolone) gets blue shifted by around 30 cm^{-1} showing the participation of this group in complex formation. The, νC=N at 1617 cm^{-1} in AAPAAC also gets shifted to approximately 1580-1590 cm^{-1} indicating the coordination of azomethine nitrogen to the metal atoms [11,18]. From the IR spectra, it is revealed that the ligand, AAPAAC possess a neutral bidentate coordination through the pyrazolone -C=O and the azomethine nitrogen, thus forming a stable six membered ring around the metal atoms under consideration. The zirconyl complexes exhibit one strong band in the region 900 -870 cm^{-1}which can be attributed to the ν(Zr=O) indicating the presence of $(Zr=O)^{2+}$ moiety in these complexes[19]. Monodentate nature of the nitrate in $[ZrO(AAPAAC)_2(NO_3)_2]$ is revealed by the presence of strong bands in the region 1376 (ν_4) cm^{-1} and ~1238 (ν_1) cm^{-1} with a medium band at ~1040 cm^{-1}. The separation ~138 cm^{-1} between ν_4 and ν_1 of the nitrate group indicate the presence of terminal monodentate nitrate group [20].

Table - 2
Selected IR bands (cm^{-1}) with tentative assignments of ligand and its metal complexes

Compound	υ(N-H)	υ_{free}(C=O)	υH-bonded (C=O)	υ(C=O) pyrazolone	υ (C=N)	υ (N-N)	υ (M-N)
AAPAAC	3310	1720	1630	1664	1602	1140	-
$[ZrO(AAPAAC)_2Cl_2]$	3310	1720	1630	1640	1590	1140	540
$[ZrO(AAPAAC)_2(NO_3)_2]$	3310	1718	1630	1640	1590	1140	553

Electronic spectra

The electronic spectra of most of the zirconyl complexes are difficult to explain due to the formation of high intensity L→M charge transfer bands. The electronic spectra of the zirconyl complexes were recorded in methanol and exhibit bands in the region 240-260 nm (41,667-38,462 cm^{-1}) and 280-300 nm (35,714- 33,333 cm^{-1}) which can be assigned as the π- π* and n-π* transitions of ligand, AAPAAC. The broad band around 340 nm (29,412 cm^{-1}) in $[ZrO(AAPAAC)_2Cl_2]$may be due to the charge transfer bands besides the ligand bands. In $[ZrO (AAPAAC)_2(NO_3)_2]$, the broad band around 400 nm (25,000 cm^{-1}) is assigned to the charge transfer bands and the weak broad band observed at 550 nm (18,182 cm^{-1}) is assigned to the O→Zr transition of zirconyl[19,21].

The electronic spectra of zirconyl complexes are presented in Figs.1 &2and the corresponding data in table 3.

Table - 3
Electronic spectral bands of AAPAAC and its oxo metal complexes

Compound	π- π*	n-π*	Charge transfer
AAPAAC	230	290	390
[ZrO(AAPAAC)2Cl2]	255	330	340
[ZrO(AAPAAC)2(NO3)2]	245	325	400

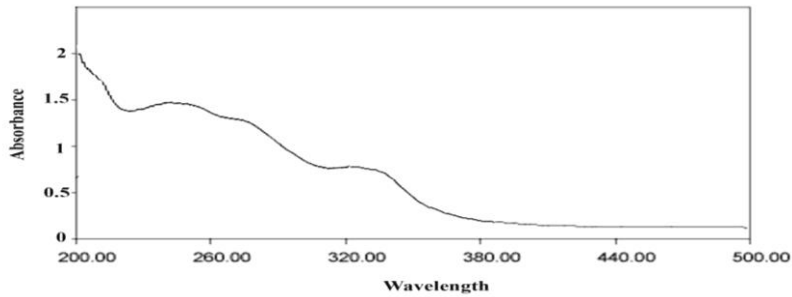


Fig. 1 Electronic spectrum of [ZrO $(AAPAAC)_2Cl_2$]

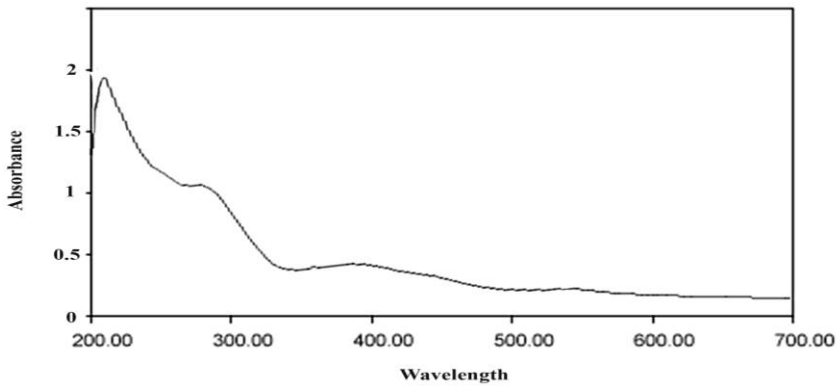


Fig. 2 Electronic spectrum of [ZrO $(AAPAAC)_2(NO_3)_2$]

Spectral & Biological Characterization

^{1}H NMR spectra

The ^{1}H NMR spectrum of [ZrO (AAPAAC)$_2$Cl$_2$] and AAPAAC in DMSO-d$_6$ is shown in Table 4. The spectrum of the complex is almost similar to that of the ligand, AAPAAC with minor shifts upon coordination. A singlet at 14.51 ppm in the ligand spectrum is assigned to the proton attached to the nitrogen atom involved in intramolecular hydrogen bonding[11]Existance of this signal at 14.51 ppm in the complex indicates that the same structure of AAPAAC exist in the complex also.

Table - 4
^{1}H NMR spectral assignments of AAPAAC and its oxo metal complexes

Compound	C-CH3	N-CH3	C-CH3 (H-bonded)	C-CH3 free	Aromatic protons	N-H (H-bonded)
AAPAAC	2.25 (3)	3.15 (3)	2.58 (3)	2.40(3)	7.36 – 7.56	14.55
[ZrO(AAPAAC)$_2$Cl$_2$]	2.26(3)	3.20(3)	2.60(3)	2.40(3)	7.35-7.60	14.51

Thermal Study

Thermal behavior of the complex [ZrO (AAPAAC)$_2$Cl$_2$] was studied by TGA in nitrogen atmosphere at a heating rate of 10 °C/min. (Fig.3). Thermal decomposition data of the complex is given in Table 5. The thermogram shows that the complex is thermally quite stable. The complex shows gradual loss in weight due to the decomposition of fragments with increasing temperature. The complex is stable up to 200 °C. The complex decomposes in two steps as denoted by the DTG peaks at 250 °C and 500 °C. The initial mass loss of 8.54 % (theoretical 8.79 %) may be due to the elimination of two moles of chlorine molecule from the complex. The second stage of decomposition starts at 443 °C and the final mass loss of 75.91 % (75.94 %) may be due to the corresponding metal oxide [22].

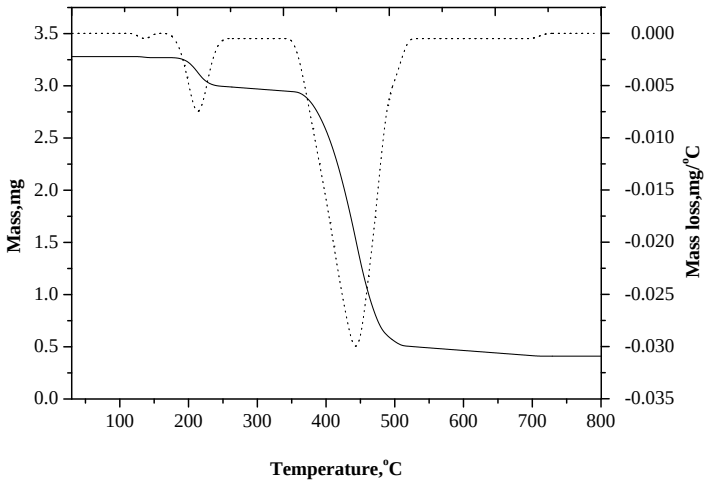


Fig.3 TG/DTG of [ZrO (AAPAAC)$_2$Cl$_2$]

Table - 5
Thermal decomposition of [ZrO (AAPAAC)$_2$Cl$_2$] and [UO$_2$(AAPAAC)$_2$(NO$_3$)$_2$]

Complex	Stages of Decomposition	Weight loss (%)		Final residue
		TG	Theoretical	
[ZrO(AAPAAC)$_2$Cl$_2$]	I	8.79	8.54	ZrO$_2$
	II	75.94	75.91	

The complex is anhydrous, stable up to 230 °C. The complex decompose in two steps as denoted by the DTG peaks at 250 °C and 500 °C. The initial mass loss of 8.54 % (theoretical 8.79 %) may be due to the elimination of two moles of chlorine molecules from the complex. The second stage of decomposition starts at 443 °C and the final mass loss of 75.91 % (75.94 %) may be due to the corresponding metal oxide.

Molecular Modeling

The 3D molecular models of the complex, $[ZrO(AAPAAC)_2Cl_2]$,has been constructed by using the Modeling and Analysis Software CHEM BIO 3D Ultra 11.0[12] .Fig. 6.14 shows the Chem 3D model of the complex with lowest steric energy. The molecular modeling force fields in use for molecular system can be interpreted in terms of bond stretchings, angle bending, tortional terms and non-bonded interactions (Leach, 2001). The details of the bond lengths and bond angles of the complexes as per 3D structure are shown in Table 6.8. The different bond lengths and bond angles and the various atoms in the compound are numbered in Arabic numerals. Except a few cases, optimal values of both the bond lengths and bond angles are given in the tables along with the actual values. The actual bond lengths and bond angles in the tables are the calculated values as a result of energy optimization in CHEM 3D. The optimal bond lengths /bond angles are the most desirable bond lengths /bond angles established by the builder unit of the CHEM 3D. The missing of some values of standard bond lengths and bond angles may be due to the limitations of the software. In most of the cases, the actual bond lengths and bond angles are close to the optimal values. Thus, the proposed structures of the complexes are acceptable.

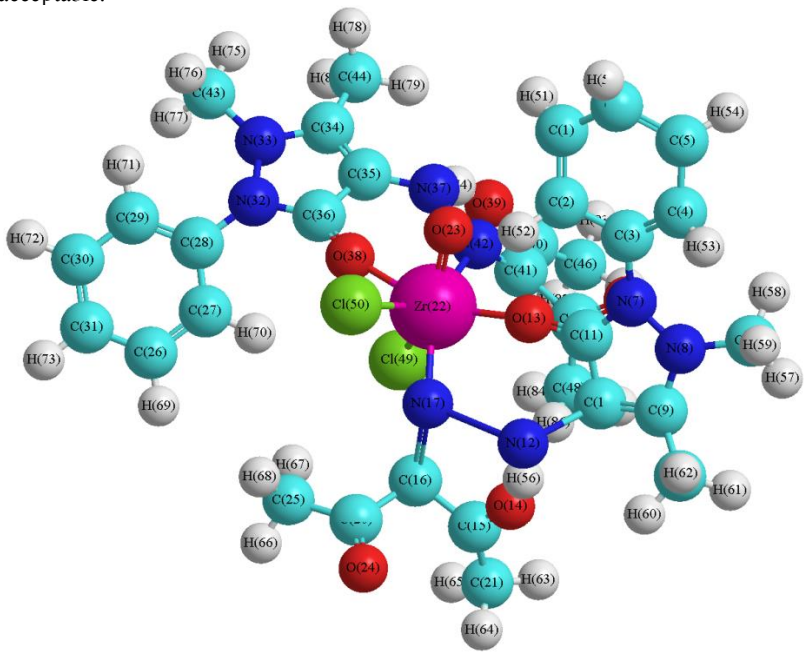


Table - 6
Selected bond lengths and bond angles of [ZrO (AAPAAC)$_2$Cl$_2$]

Atoms	Bond length (Å)	Atoms	Bond angles (°)
Zr(22)-Cl(50)	2.4521	Zr(22)-N(42)-N(37)	119.5790
Zr(22)-Cl(49)	2.4458	Zr(22)-N(42)-C(41)	117.3190
O(38)-Zr(22)	2.0913	Zr(22)-O(38)-C(36)	157.3370
N(42)-Zr(22)	2.1539	Cl(50)-Zr(22)-Cl(49)	116.9420
N(42)-N(37)	1.5664	Cl(50)-Zr(22)-O(38)	73.1616
Zr(22)-O(23)	1.8099	Cl(50)-Zr(22)-N(42)	140.9270
N(17)-Zr(22)	2.1452	Cl(50)-Zr(22)-O(23)	75.7262
O(13)-Zr(22)	2.0964	Cl(50)-Zr(22)-N(17)	72.7699
N(17)-N(12)	2.3695	Cl(50)-Zr(22)-O(13)	111.0450
		Cl(49)-Zr(22)-O(38)	72.7462
		Cl(49)-Zr(22)-N(42)	77.9544
		Cl(49)-Zr(22)-O(23)	146.4330
		Cl(49)-Zr(22)-N(17)	84.0703
		Cl(49)-Zr(22)-O(13)	120.5540
		O(38)-Zr(22)-N(42)	78.2963
		O(38)-Zr(22)-O(23)	82.8556
		O(38)-Zr(22)-N(17)	123.0830
		O(38)-Zr(22)-O(13)	157.2480
		N(42)-Zr(22)-O(23)	74.7293
		N(42)-Zr(22)-N(17)	146.2830
		N(42)-Zr(22)-O(13)	86.3716
		O(23)-Zr(22)-N(17)	129.1620
		O(23)-Zr(22)-O(13)	76.9008
		N(17)-Zr(22)-O(13)	78.5145
		Zr(22)-N(17)-N(12)	117.3540
		Zr(22)-N(17)-C(16)	113.0460
		Zr(22)-O(13)-C(11)	170.6150

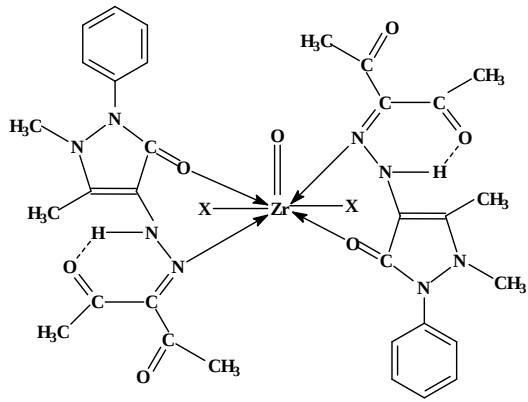
Fig. 4 Optimized geometry of [ZrO (AAPAAC)$_2$Cl$_2$]

Antibacterial Studies

The ligand, AAPAAC and its two zirconyl complexes have been screened for antibacterial activity against Gram-negative *Eschericia coli* and Gram-positive *Bacillus cereus* using the disc diffusion method[23,24] .As a reference standard, *Streptomycin* was used. The data obtained showed that the complexes were weakly active against *E. coli and B. cereus.* The ligand had the largest zone of inhibition, which was against *Bacillus cereus*(inhibition zone diameter of 9 mm; 0.1 mg/ disc).

Conclusion

Two zirconyl complexes of the pyrazolinyl hydrazone ligand, AAPAAC has been synthesized and characterized on the basis of their various physico chemical studies. The electrical conductance studies show that the two complexes are non-electrolytic in nature. Magnetic measurement studies reveals the diamagnetic nature of the complexes. Electronic spectra of the complexes are also consistent with the observed magnetic measurement. The electronic spectra shows the intraligand and charge transfer transitions. Infrared spectra show the coordination of metal ions through the pyrazolone oxygen and through the azomethine nitrogen. In all the complexes the ligand act as a neutral bidentate and there is a six coordinated structure around $(ZrO)^{2+}$. The ^{1}H NMR study of the zirconyl complexes reveal the existence of the intramolecularly hydrogen bonded hydrazone form of AAPAAC in the complex also. Thermal study of the complex, $[ZrO\ (AAPAAC)_2(Cl)_2]$ indicates the thermal stability and the anhydrous nature of the complex studied. The following tentative structures satisfactorily explain the experimental observations.



X = Cl^- or NO_3^-

Fig. 5 Proposed structure of [ZrO (AAPAAC)X_2]

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The Philosophical Underpinnings of Educational Research

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This article traces the underlying theoretical framework of educational research. It outlines the definitions of epistemology, ontology and paradigm and the origins, main tenets, and key thinkers of the 3 paradigms; positivist, interpretivist and critical. By closely analyzing each paradigm, the literature review focuses on the ontological and epistemological assumptions of each paradigm. Finally the author analyses not only the paradigm's weakness but also the author's own construct of reality and knowledge which align with the critical paradigm. The English Language Teaching (ELT) field has moved from an ad hoc field with amateurish research to a much more serious enterprise of professionalism. More teachers are conducting research to not only inform their teaching in the classroom but also to bridge the gap between the external researcher dictating policy and the teacher negotiating that policy with the practical demands of their classroom. I was a layperson, not an educational researcher. Determined to emancipate myself from my layperson identity, I began to analyses the different philosophical underpinnings of each paradigm, reading about the great thinkers' theories and the evolution of social science research.

Keywords: Paradigm, Epistemology, Positivism, Interpretivism and Research.

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Introduction

Through this process I began to examine how I view the world, thus realizing my own construction of knowledge and social reality, which is actually quite loose and chaotic. Most importantly, I realized that I identify most with the critical paradigm assumptions and that my future desired role as an educational researcher is to affect change and challenge dominant social and political discourses in ELT. The following literature review is the product of my transformation from teacher to educational researcher.

I will begin by defining the operational definitions of ontology, epistemology and paradigm. Then, I trace the origins, main tenets, and key thinkers of the 3 paradigms; positivist, interpretivist and critical, focusing on the ontological and epistemological assumptions of each paradigm. Through this analysis of different paradigms, I will expose not only each paradigm's weakness but also my own construct of reality and knowledge.

Ontology, Epistemology and Paradigms

Simply put, one's view of reality and being is called ontology and the view of how one acquires knowledge is termed epistemology. Ontology is the starting point which will likely lead to your own theoretical framework. For this paper, I employ Blaikie's (as cited in Grix, 2004, p. 59) definition of ontology as the study of "claims and assumptions that are made about the nature of social reality, claims about what exists, what it looks like, what units make it up and how these units interact with each other." In other words, if someone studies ontology they study what we mean when we say something exists.

If Ontologists study what we mean when we say something exists then an epistemologist studies what we mean when we say we know something. For this paper, I utilize Crotty's definition of epistemology, defined as "the theory of knowledge embedded in the theoretical perspective and thereby in the methodology" (1998, p. 3). Together, ontological and epistemological assumptions make up a paradigm.

The term paradigm, first termed by Thomas Kuhn in his 1972 book, titled "The structure of Scientific Revolutions", refers to an overall theoretical research framework. In this paper, I employ Bodgan & Biklen's (as cited in Mackenzie and Knipe, 2001, p. 2)

Polyglossia Volume 19, October 2010 definition of a paradigm as "a loose collection of logically related assumptions, concepts or propositions that orient thinking and research." Why does one's view of knowledge and social reality relate to educational research? One view is that the researcher's intentions, goals and philosophical assumptions are inextricably linked with the research they do. Grix, (2004) warns that people who want to conduct clear, precise research and evaluate other's research need to understand the philosophical underpinnings that inform their choice of research questions, methodology, methods and intentions (p. 57). Therefore, how one views the constructs of social reality and knowledge affects how they will go about uncovering knowledge of relationships among phenomena and social behaviour and how they evaluate their own and other's research.

Crotty (1998) argues that researchers can choose which stage to begin at, ontological, epistemological, methods ormethodology. According to Grix (2004) research is best done by: setting out clearly the relationship between what a researcher thinks can be researched (her ontological position) linking it to what we can know about it (her epistemological position) and how to go about acquiring it you can begin to comprehend the impact your ontological position can have on what and how you decide to study (Grix, 2004, p. 68). Moreover your ontological assumptions inform your epistemological assumptions which inform your methodology and these all give rise to your methods employed to collect data.

The Positivist Paradigm

The positivist paradigm is also called the scientific paradigm. The purpose of research in this paradigm is to prove or disprove a hypothesis. Other characteristics of positivist research include an emphasis on the scientific method, statistical analysis, and generalizable findings. Furthermore, positivist research usually has a control and experimental group and a pre/test post method.

The term positivism was first coined by the founder of positivism, Auguste Comte, the French philosopher who believed that reality can be observed. Cohen, Manion, and Morrison (2007) claim that "Comte's position was to lead to a general doctrine of positivism which held that all genuine knowledge is based on sense experience and can be advanced only by means of observation and experiment" (p. 9). Positivism maintains that the scientist is the observer of an objective reality. From this understanding of ontology, the

methodology for observation in natural science was adopted for social science research.

The Ontological and epistemological assumptions tend to overlap. As Crotty points out, "to talk of the construction of the meaning is to talk of the construction of meaningful reality" (Crotty, 1998, p. 10). These assumptions can be divided into two broad categories. The following chart outlines the ontological and epistemological assumptions of positivism.

Main Thinkers	*Philosophy*
Aristotle	Deductive reasoning
Descartes	Realism
Galileo	Scientific method
Auguste Comte	Positivism
Vienna Circle	Logical positivism
Francis Bacon	Inductive reasoning
Karl Popper	Post positivist

Fig. 1: Positivist Thinkers and Philosophies.

The above is a table highlighting the main thinkers associated with positivism and the philosophies they championed, all of which were influential in some way to the formation of present-day positivism.

Ontological Assumptions

- Reality is external to the researcher and represented by objects in space.
- Objects have meaning independently of any consciousness of them.
- Reality can be captured by our senses and predicted.

Epistemological Assumptions

- The methodology of the natural sciences should be employed to study social reality (Bryman, as cited in Grix, 2004, p. 64).
- Truth can be attained because knowledge rests on a set of firm, unquestionable, indisputable truths from which our beliefs may be deduced (Hughes and Sharrock, as cited in Grix, 2004, p. 64).
- Knowledge is generated deductively from a theory or hypothesis.
- Knowledge is objective.

Post Positivist

There has been criticism of the positivist paradigm for applying the scientific method to research on human affairs. These opponents argued that uniform causal links that can be established in the study of natural science cannot be made in the world of the classroom where teachers and learners construct meaning. In response to this criticism, Karl Popper argued that we should not quickly disregard all the good qualities of the scientific method. Rather, we can make small adjustments that can be improved upon to provide objective research within the social sciences. In his famous book, "The Logic of Scientific Discovery"

Popper declares that there are no absolute truths. Moreover, he claims that scientific theories cannot be confirmed but only falsified. Theories can never obtain the real truth they can only get closer to the truth (Ernest, 1994). Today a positivist, "claims a certain level of objectivity rather than absolute objectivity, and seeks to approximate the truth rather than aspiring to grasp it in its totality or essence" (Crotty, 1998, p. 29). In general, when people refer to themselves as positivists they are talking more about probability than absolute certainty.

Limitations

Despite Popper's criticism I still question the certainty that one can apply a methodology used to research a natural science to research a social science. I disagree that "positivist science provides us with the clearest possible ideal knowledge" (Cohen et al, 2007, p. 11). Even if you are falsifying a hypothesis instead of affirming it, you are still assuming that this research is

objective and reflects social reality. No matter how stringently a scientist adheres to the scientific method, there is never an outcome that is objective. Although behavioral uniformities exist, they are not, "evidence [of an] underlying essential uniformity among entities, but [an] illusion - a social construction." (Erikson, 1986, p. 126 as cited in Gage, 1989, p. 5).

The critical theorist, Habermas emphasizes the determinist view of science as the "ideal knowledge" which ignores the moral choices, values and judgments scientists make (Cohen et al, 2007, p. 18). Furthermore, I find fault with the positivist ideology of parsimony (theories should be as simple and concise as possible). It is impossible for any theory in social science to be simple and precise because the world we live in and peoples' multiple perspectives and interpretations of events make theories complex and chaotic. So many variables affect different events and people's actions that it is impossible to determine an absolute truth. The above criticism led to the formation of a different paradigm, the interpretivist paradigm.

The Interpretivist Paradigm

The interpretivist paradigm can be also called the "anti-positivist" paradigm because it was developed as a reaction to positivism. It is also sometimes referred to as constructivism because it emphasizes the ability of the individual to construct meaning. The interpretivist paradigm was heavily influenced by hermeneutics and phenomology. Hermeneutics is the study meaning and interpretation in historical texts. This meaning-making cyclical process is the basis on which the interpretivist paradigm was established (Ernest, 1994). Another strong influence is the philosophical movement, Phenomology. A Phenomologist advocates the "need to consider human beings' subjective interpretations, their perceptions of the world (their life-worlds) as our starting point in Polyglossia Volume 19, October 2010 understanding social phenomena" (Ernest, 1994, p. 25). Therefore the ontological assumptions of interpretivism are that social reality is seen by multiple people and these multiple people interpret events differently leaving multiple perspectives of an incident. The following is a chart highlighting some of the main thinkers and their philosophies associated with interpretivism.

Main Thinkers

- Edmund Husserl, Arthur Schultz
- Wilhelm Dilthey, Han-Georg Gadamer

- Herbert Blumer
- Harold Garfinkel

Philosophy

- Phenomenology
- Hermeneutics
- Symbolic interaction
- Ethnomethodology

Interpretivism 's main tenet is that research can never be objectively observed from the outside rather it must be observed from inside through the direct experience of the people. Furthermore, uniform causal links that can be established in the study of natural science cannot be made in the world of the classroom where teachers and learners construct meaning. Therefore, the role of the scientist in the interpretivist paradigm is to, "understand, explain, and demystify social reality through the eyes of different participants" (Cohen et al, 2007, p. 19). Researchers in this paradigm seek to understand rather than explain. The following are the main epistemological and ontological assumptions of the interpretivist paradigm.

Ontological Assumptions

- Reality is indirectly constructed based on individual interpretation and is subjective
- People interpret and make their own meaning of events.
- Events are distinctive and cannot be generalized.
- There are multiple perspectives on one incident.
- Causation in social sciences is determined by interpreted meaning and symbols.

Epistemological Assumptions

- Knowledge is gained through a strategy that "respects the differences between people and the objects of natural sciences and therefore requires the social scientist to grasp the subjective meaning of social action" (Bryman as cited in Grix, 2004, p. 64).
- Knowledge is gained inductively to create a theory.

- Knowledge arises from particular situations and is not reducible to simplistic interpretation.
- Knowledge is gained through personal experience.

Limitations

One of the limitations to interpretive research is that it abandons the scientific procedures of verification and therefore results cannot be generalized to other situations. Therefore, many positivists question the overall benefit of interpretivist research.

However, I respond to this by pointing out that the research will resonate with other teachers, so it will be similar to other peoples' work. For example, action research, one of the methodologies from the interpretivist paradigm, shows teachers how issues can be problematized and addressed in productive ways. It deliberately intervenes in the research setting to achieve change or improvement. Its goal is the creation of local theories for practice rather than generalizable findings.

Later, I will discuss the different methodologies associated with each of the different paradigms. Another criticism of Interpretivism is that the ontological assumption is subjective rather than objective. As mentioned in the positivist paradigm section, I believe all research is subjective. By selecting your paradigm you are being subjectively oriented towards one way of doing research. You cannot divorce yourself from your perspective as the researcher. In qualitative research, you are being more subjective in the sense that you are not using a hypothesis and you are involving yourself in the research. However, Interpretivists still take an objective stance when analyzing the data they collect. By bracketing their assumptions, they look at the data thoroughly so that the data informs the researcher about what is going on in the environment, instead of the researcher's own preconceptions.

The Philosophical Underpinnings of Educational Research

The strongest criticism of Interpretivism is that it neglected to acknowledge the political and ideological influences on knowledge and social reality. Moreover, Interpretivism was not radical enough. While the positivist researcher seeks to explain social phenomena, and the interpretivist researcher seeks to understand social phenomena, the researcher who seeks to change

and to challenge social phenomena is not represented. This concern is addressed in the next section, on the critical paradigm.

The Critical Paradigm

The critical paradigm stems from critical theory and the belief that research is conducted for "the emancipation of individuals and groups in an egalitarian society" (Cohen et al, 2007, p. 26). The critical educational researcher aims not only to understand or give an account of behaviours in societies but to change these behaviours. The critical paradigm embodies different ideologies such as postmodernism, neo-Marxism and feminism. The following is a chart highlighting the main thinkers and their philosophies that are associated with the critical paradigm.

Main Thinkers

- Theodor Adorno, Max Horkheimer, Herbert Marcuse, Erich Fromm
- Karl Appel, Jurgen Habermas
- Paulo Friere
- Michel Foucault
- Alastair Pennycook
- Norman Fairclough
- Eve Kosofsky Sedgwick, Judith Butler
- Simone de Beauvoir, Betty Friedan
- Thomas Kuhn, Jacques Derrida

Philosophy

- Frankfurt school and
- Critical Theory (1930s)
- Critical Theory (1970s)
- Critical Pedagogy
- Structuralism
- Critical Applied Linguistics
- Critical Discourse Analysis
- Queer theory
- Feminism
- Post modernism

Critical theory originated from the criticism that educational research was too technical and concerned with only efficiency and rationality of design, neglecting social inequalities and issues of power (Gage, 1989). According to the critical theorists, researchers should be looking for the "political and economic foundations of our construction of knowledge, curriculum, and teaching." (Gage, 1989, p. 5) Schools play an explicit part in this construction of knowledge based on power in society. In other words, education serves the interests of those who have power, usually rich white males. Schools function to reproduce these inequalities and maintain the status quo (Gage, 1989).

Educational research in the critical paradigm should challenge these reproductions of inequalities. People must challenge dominant discourses. Educational research and schools, "like other social institutions, such as the media and the legislatures must be the scenes of the necessary struggles for power" (Gage, 1989, p.5). Moreover, this research has an agenda, to change the participants' lives or the structures of the institution. The following are the main epistemological and ontological assumptions of critical theory.

Ontological Assumptions

Social reality defined from persons in society. Social reality is socially constructed through media, institutions and society. Social behaviour is the outcome of "particular illegitimate, dominatory and repressive factors, illegitimate in the sense that they do not operate in general interest- one person's or group's freedom and power is bought at the price of another's freedom and power" (Cohen et al, 2007, p. 26).

Epistemological Assumptions

- Knowledge is socially constructed through media, institutions and society.
- "What counts as worthwhile knowledge is determined by the social and positional power of the advocates of that knowledge" (Cohen et al, 2007, p. 27).
- Knowledge is produced by power and is an expression of power rather than truth.

Critical Pedagogy and Critical Applied Linguistics

In the last 20 years, the ESL field has seen an influx of literature dealing with Critical theories and approaches. Under this umbrella, critical applied linguistics (CAL) and critical pedagogy, CP, have been touted by recent theorists as an important aspect of effective English language instruction towards culturally and linguistically diverse classrooms. Theorists, emphasize that critical pedagogy is not a settled body of practices that teachers can emulate but rather a framework, a way of thinking and a way of problematizing ESL.

According to Shor (1992) critical pedagogy refers to, Habits of thought, reading, writing, and speaking which go beneath surface meaning, first impressions, dominant myths, official pronouncements, traditional cliches, received wisdom, and mere opinions, to understand the deep meaning, root causes, social context, ideology, and personal consequences of any action, event, object, process, organization, experience, text, subject matter, policy, mass media, or discourse. (p. 129) In other words, critical pedagogy requires students to examine their own society through the lenses of power in order to expose structural inequalities and marginalized groups.

The main goal of critical pedagogy is to draw on the strengths of students' lived experience to create a forum for their analysis of the world around them (Giroux, 1992).

To me, CP and CAL are not only about challenging dominant theories and the status quo, but rather raising a critical consciousness in students, to question dominant cultural, political, and social domains (Freire, 1968; Giroux, 1992, Gore, 1993).

Raising one's critical consciousness is the first step needed in the transformative process in which a lesson and skill is enacted and practiced, otherwise known as a "praxis." Praxis leads to social transformation in the classroom and in the collective societal level (Stevens, 2009).

Limitations

Critical theory is criticized for its elitism. By assuming that everyone needs to be emancipated, critical theorists assume that they have been emancipated and therefore are better equipped to analyses society and

transform it than someone else. Furthermore, there is a lack of evidence that illustrates what happens when you become emancipated and gain a critical consciousness. Is there any evidence that shows that once someone attains a critical consciousness he/she stops reproducing inequalities that subtly oppress people? Furthermore, positivists criticize critical research for their deliberate political agenda and failure to remain an objective neutral researcher.

Critical pedagogy in ESL is criticized for its limited work on concrete teacher practices (Johnston, 1999). Self-proclaimed critical pedagogues are left to their own devices to translate this framework into their everyday teaching. Other scholars question the appropriateness of CP and argue that CP is not always suitable for the periphery and is informed by pedagogical assumptions that are not always in line with the local community's and students' expectations and preferences (O Mochain & Perkins, 2010). Canagarajah (1999) warns against critical pedagogues thinking that, "students have freedom to transcend the institutionalized forms of power in the classroom to engage creative linguistic experimentation and text production."(p. 191)

Conclusion

Through this detailed analysis and reflection on the different philosophical underpinnings of educational research I was able to discover my own purpose for doing research. I discovered that I align my research interests with the critical paradigm. Originally, I began teaching to effect change, promote student agency and help fight against the achievement gap in American urban public schools. Now my role as an educator has changed but I still believe in those original principles that led me to teaching in the first place: social equality, and teaching as being transformative and emancipatory.

For me, the definition of educational research has always been "critical enquiry aimed at informing educational judgments in order to improve educational action" (Bassey, 1999). The educational practice has a broader moral purpose (Pring, 2000) and educational research has a moral obligation to address these social and political inequalities. My own goal is to enter education to address social and political inequalities, "so as to reconstruct education and the society at large for the achievement of greater social justice" (Gage, 1989, p. 5).

I hope my own reflection and enquiry will encourage other teachers turned researchers to discover which paradigm they align with and their own construct of knowledge and power in order to give new meaning to their research.

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Differentiated Instruction: A Road to Meaningful Learning

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Our schools utilizes mainly linguistic and logical teaching methods to impart information. It also uses a limited range of learning and teaching techniques. Many schools still rely on classroom and book-based teaching, much repetition, and pressured exams for reinforcement and review. When students are active in learning process it encourages for reflective thought, creative response, and unique commentary. Students will process and challenge the information they hear or seek though personal discovery. This method allow students to make "sense" of what they learn in class and to give the new information meaning. Differentiation means tailoring instruction to meet individual needs. Teaching the same material to all students using a variety of instructional strategies. Teacher differentiate by modifying the content, the process, the product and learning environment. This paper highlights that differentiated learning cater the needs of students with diverse learning styles Student initiated experimentation and invention are encouraged in differentiated instruction. One important practice is it link the indoors with. outdoors for movement to stimulate the uptake of oxygen, which has a positive effect on learning. Learning styles speaks to the understanding that every student learns differently. Technically, an individual's learning style refers to the preferential way in which the student absorbs processes, comprehends and retains information. It also explains the process that takes place in brain while learning concepts through differentiated instruction.

Keywords: Meaningful Learning, Information, Teacher and Learning Styles.

Introduction

How human beings learn is an extremely complex process. Learning is a continuous process, a lifelong commitment to knowledge. The exponent of multiple intelligence Howard Gardner (1993), describes intelligence as the bio-psychological potential to process information in certain ways in order to solve problems or fashion products that are valued in a culture or community. The big question to think over is whether our school education is successful in producing smart intelligent people as their products.

The saddest thing is that even today Lecture continues to be the most widely used method in the classrooms. According to Gardner the biggest mistake of past centuries in teaching has been to treat all children as if they were variants of the same individual and thus to feel justified in teaching them all the same subjects in the same way. Our schools utilizes mainly linguistic and logical teaching methods to impart information. It also uses a limited range of learning and teaching techniques. Many schools still rely on classroom and book-based teaching, much repetition, and pressured exams for reinforcement and review.

Active learning

According to Piaget (1973) to understand is to discover, or reconstruct by discovery, and such conditions must be complied with if in the future individuals are to be formed who are capable of production and creativity and not simple repetition. When students are active in learning process it encourages for reflective thought, creative response, and unique commentary. Students will process and challenge the information they hear or seek though personal discovery. This method allow students to make "sense" of what they learn in class and to give the new information meaning., Countless studies indicate that students retain the most by teaching others, practicing by doing, and discussing in groups. Immediate, active use of learning is clearly the best means of retaining information (Sousa, 1995).

Differentiated Learning

Differentiated instruction is defined as "a philosophy of teaching that is based on the premise that students learn best when teachers accommodate the differences in their readiness levels, interest, and learning profiles"

(Konstantinou-Katzi et al., 2012, p. 333). It means tailoring instruction to meet individual needs. Teaching the same material to all students using a variety of instructional strategies. Teacher differentiate by modifying the content, the process, the product and learning environment. Student initiated experimentation and invention are encouraged in differentiated Instruction. One important practice is, it link the indoors with outdoors for movement to stimulate the uptake of oxygen, which has a positive effect on learning. Another is it creates a rich stimulating environment through hands-on activities and classrooms with rich colors, textures and students' work to indicate "ownership" of knowledge (Lackney, 1998). Earlier studies by Greenenough, et al., (1993) and Karni, et al. (1995), indicated that an enriched (stimulating) environment affects growth in the brain.

Content differentiation means it should include both lower order thinking skills and higher order thinking skills. Remembering, understanding, thinking applying, analyzing, evaluating and creating. Differentiation is a teacher's response to a learners need. Product is what the student creates at the end of a lesson to demonstrate the mastery of the content.

Different learning styles should be satisfied. Student has an individual learning style. Each student has a preferred learning style and successful differentiation includes delivering the material to each style. Differentiation in learning environment includes various types of furniture. Arrangement to support both individual and group work. Differentiated learning satisfies all types of learners. Students take responsibilities. Teachers who differentiate are teachers who consider student learning preferences, abilities, styles and interests.

Differentiated Learning and Learning Styles

Differentiated learning cater the needs of students with diverse learning styles. Learning styles" speaks to the understanding that every student learns differently. Technically, an individual's learning style refers to the preferential way in which the student absorbs, processes, comprehends and retains information. Learning Style can be defined as "the way that he or she concentrates on, processes, internalizes, and remembers new and difficult academic information or skills" (Shaughnessy).

This notion of individualized learning styles has gained widespread recognition in education theory and classroom management strategy. Individual learning styles depend on cognitive, emotional and environmental factors, as

well as one's prior experience. In other words: everyone's different. It is important for educators to understand the differences in their students' learning styles, so that they can implement best practice strategies into their daily activities, curriculum and assessments. To meet those needs, teachers need to change materials, instructional procedures, and also means of assessment (Southall, 2013).

Many studies were conducted to understand the learning styles of students. David A. Kolb was an American educational theorist who outlines two related approaches toward grasping experience: Concrete Experience and Abstract Conceptualization, as well as two related approaches toward transforming experience: Reflective Observation and Active Experimentation. According to Kolb's model, the ideal learning process engages all four of these modes in response to situational demands; they form a learning cycle from experience to observation to conceptualization to experimentation and back to experience. In order for learning to be effective, Kolb postulated, all four of these approaches must be incorporated.

Peter Honey and Alan Mumford adapted Kolb's experiential learning model. First, they renamed the stages in the learning cycle to accord with managerial experiences: having an experience, reviewing the experience, concluding from the experience and planning the next steps.

Second, they aligned these stages to four learning styles named-Activist, Reflector, Theorist and Pragmatist. Walter Burke Barbe and colleagues proposed three learning modalities (often identified by the acronym VAK): Visualising modality, auditory modality and kinesthetic modality. The VAK learning style uses the three main sensory receivers: Visual, Auditory, and Kinesthetic (movement) to determine the dominant learning style. It is sometimes known as VAKT (Visual, Auditory, Kinesthetic, & Tactile).

In the 1980s, the National Association of Secondary School Principals (NASSP) formed a task force to study learning styles. The task force defined three broad categories of style—cognitive, affective, and physiological and other 31 variables, including the perceptual strengths and preferences from the VAK model of Barbe and colleagues, but also many other variables such as need for structure, types of motivation, time of day preferences, and so on.

]Generally, the Seven Learning Styles identified are

- Visual (spatial): learner prefer using pictures, images, and spatial understanding.
- Aural (auditory-musical): learner prefer using sound and music.
- Verbal (linguistic): learner prefer using words, both in speech and writing.
- Physical (kinesthetic): learner prefer using your body, hands and sense of touch.
- Logical (mathematical): learner prefer using logic, reasoning and systems.
- Social (interpersonal): learner prefer to learn in groups or with other people.
- Solitary (intrapersonal): learner prefer to work alone and use self-study.

Learner's preferred styles guide the way they learn. It also changes the way of internally representing experiences, the way to recall information, and even the words chosen. Visual learners understand and learn best when information is presented to them visually. Seeing information helps these students visualize concepts taught.

Auditory Learners understand and learn best when information is presented to them in an auditory manner. Hearing information helps these students internalize concepts taught.

Kinesthetic Learners understand and learn best when information is presented to them kinesthetically. Using their hands or bodies helps these students experience the concepts taught. Children receive information through these three channels all day long and as children get older and develop, one channel will easily facilitate acquisition better than the others. While students can have a mixture of styles and learn in all of the ways mentioned above, each child will most likely have one style that is dominant for taking in new material in the classrooms.

Neuroscience of Differentiated Learning

Our brains are fascinating, intricate structures, with unique complexities. Altogether, the human brain contains 100 billion nerve cells that make 1,000 trillion synaptic connection points with one another (D'Arcangelo,

1998). We are constantly organizing and reorganizing our brains, changing both the physical structure of the brain and the knowledge we hold (Bransford and Cocking, eds, 2000)

Learning is the formation of new synapses and dentrite branching (Zull, 2002). It appears that learning is enhanced when multiple neural pathways are activated at the same time. In plain terms, the more we can activate students' brains in different ways, the more they learn.

This means that engaging as many sensory, cognitive, emotional and social processes in students will increase their learning potential. This can be accomplished by adopting a teaching strategy that provide variety in sensory experiences. For optimal learning to occur, the brain needs conditions under which it is able to change in response to stimuli (neuroplasticity) and able to produce new neurons (neurogenesis).The most effective learning involves recruiting multiple regions of the brain for the learning task. These regions are associated with such functions as memory, the various senses, volitional control, and higher levels of cognitive functioning.

Cognitive functions associated with the lower levels of Bloom's taxonomy such as understanding and remembering, are associated with the hippocampus (the area of the brain responsible for memory and spatial awareness). The higher-level cognitive functions of Bloom's taxonomy, such as creating, evaluating, analyzing, and applying, involve the cortical areas responsible for decision-making, association, and motivation.

The hippocampus is centrally located, meaning that it can connect with various cortical regions throughout the brain. Cortical regions are the outside layer of the brain, where all higher order processes take place. More complex thought processes are more beneficial for learning because they involve a greater number of neural connections and more neurological cross-talk. Differentiated Learning takes advantage of this cross-talk, stimulating a variety of areas of the brain and promoting memory.

When we learn new information, neurons that code for different aspects of this information begin firing at the same time and "wire together" as a result, physically connecting pieces of older knowledge to create new knowledge. When neurons are firing at the same time, this sends a signal that the two areas (or groups of neurons) are responding to the same information source, and the two areas or clusters should 'meet'.

But if these neurons firing at the same time are nowhere near each other than hippocampi will help to physically connect these distant neurons. First, the hippocampus connects to the cortical regions that are firing together (e.g., perceptual, linguistic, emotional, etc.). Over time, the hippocampus facilitates a direct connection between the two cortical modules, or clusters of neurons, and the specific memory no longer depends on the hippocampus. The memory is now permanently stored in our cortex, or the outer layer of our brain.

In this way, memories get permanently stored throughout the brain. In summary, as more brain areas are activated, there are a higher number of cortical modules the hippocampi have to connect. This, in turn, makes memories more deeply embedded in the brain, and more easily retrievable. While passive learning may lead to a weak connection between neurons, active multisensory learning leads to deeply embedded neural connections. Providing variety in sensory experiences during learning helps to make learning more interesting and lasting.

Differentiated Learning Experience

The world is dynamic and the horizons and landscapes are changing so do the teachers' needs and skills. Today's educators have to respond to diverse populations of students within the general education classrooms. In order to satisfy auditory learners, the teacher may begin new material with a brief explanation and the explanation may be concluded with a summary of what has been covered. Socratic Method of lecturing by questioning learners to draw as much information from them as possible may be use.

Auditory activities, such as brainstorming, buzz groups etc. should be used for providing meaningful learning experience. Students should be given enough time to debrief activities. This allows them to make connections of what they leaned and how it applies to their situation. Maintaining an internal dialogue between teacher and the learners is very useful in such a learning environment.

Auditory learners often talk to themselves. They also may move their lips and read out loud. They may have difficulty with reading and writing tasks. They often do better talk to a colleague or a tape recorder and hearing what was said. Teachers should integrate these features style into the learning technique.

Visual learners have two sub channels linguistic and spatial. Learners who are visual-linguistic like to learn through written language, such as reading and writing tasks. They remember what has been written down, even if they do not read it more than once. They like to write down directions and pay better attention to lectures if they watch them. Learners who are visual-spatial usually have difficulty with the written language and do better with charts, demonstrations, videos, and other visual materials.

They easily visualize faces and places by using their imagination and seldom get lost in new surroundings. To integrate this style into the learning environment teachers may use graphs, charts, illustrations, or other visual aids. Outlines, concept maps, agendas, handouts, etc. May be utilized for reading and taking notes. Students may be encouraged to refer books other than text books. Charts, PPT's, Maps etc. should be used to explain concept. Supplement textual information with illustrations should be given whenever possible.

Kinesthetic learners do best while touching and moving. It also has two sub-channels: kinesthetic (movement) and tactile (touch). They tend to lose concentration if there is little or no external stimulation or movement. When listening to lectures they may want to take notes for the sake of moving their hands. When reading, they like to scan the material first, and then focus in on the details (get the big picture first). They typically use color high lighters and take notes by drawing pictures, diagrams, or doodling. To integrate this style into the learning environment.

Teachers should use activities that get the learners up and moving. Playing music, Using colored markers to emphasize key points on flip charts or white boards, Giving frequent stretch breaks (brain breaks), Encouraging to use high lighters, colored pens and/or pencils, Encourage learners to transfer information from the text to another medium such as a keyboard or a tablet or to prepare ppt or draw the verbally explained concepts using concept maps etc. can be done to sustain their interest in learning. Field visit and providing motor activities also enhance their understanding level of concepts.

Further, Howard Gardner's theory of multiple intelligences identified eight distinct intelligences: linguistic, logical/mathematical, musical, bodily - kinesthetic, spatial, interpersonal, intrapersonal and naturalist. This is important when looking at how students possess different kinds of minds and therefore learn, remember, perform, and understand in different ways.

He argues that students would be better served if teachers could teach in a number of way s and learning could be assessed through a variety of means. This might reach more students and improve content retention. Learning preferences extends these ideas by effectively instructing a larger number of students to encourage the development of the less preferred style.

Conclusion

Successful learning happens only when a concept is presented in such a way that all the learners who learn it with different learning style find it meaningful and interesting. It allows learners the opportunity to become involved. All the students have the same learning goal. But the teaching approach varies depending on how students prefer to learn. Instead of using a one-size-fits-all approach, a teacher uses a variety of methods to teach.

This can include teaching students in small groups or in one-on-one sessions and incorporating various learning strategies to present a content. Differentiated instruction allows students to show what they know in different ways. It can work well in general education classes that include students with learning and attention issues. The goals of differentiated instruction are to develop engaging tasks that challenge and enhance learning for each student.

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Attitude and Skills Learning of College Students Community in Tamil Nadu – A Case Study of Students from Autonomous Colleges of Thoothukudi District

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Innovation is apparent in all spheres of life and education is also experiencing a paradigm shift in this aspect. An innovative curriculum is needed in the present-day context not only to enhance the growth and competitiveness of an individual but also it responds to the numerous and varied opportunities for using knowledge creatively and productively the existing one. In general university common curriculum development are facing the problems of lack of conceptual understanding and problem-solving skills, poor application of knowledge, continuing unemployment crisis are expected to be set right by introducing an innovative curriculum. Autonomous institutions are blessed with an opportunity where introduction of innovative curriculum is possible more frequently than in an affiliated institution and can be done more precisely at intuitional level. Colleges.

Keywords: Autonomy, Education, Attitude and Students.

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This study tries to analyze the student's perceptions about curriculum of autonomous colleges and to list out the problems associated with curriculum innovation by student community in autonomous, Methodological framework of this study, primary data collected from 75 students representing two autonomous colleges in Thoothukudi District of Tamil Nadu. The study measured to student's attitude towards functions autonomous institution in the field of curriculum development and its uses. Provisionally this study found that majority of the students of autonomous colleges get high marks in higher secondary education, sound parental education background, participation of various extracurricular activities in their academic performance. Autonomous colleges facing various problems related academic reform i.e. financial, examinations standards, academic reforms, etc., A careful approach to these problems and a meticulous planning of strategies to tackle the challenges will definitely make the autonomous system an effective way of building knowledge-based society.

Introduction

Starting with three Universities –Madras, Bombay and Calcutta –with colleges affiliated to them, India today has 575 autonomous colleges affiliated to 178 universities in 23 States as of 2016. The move towards autonomy started in the early 1970s as suggestions of the Kothari Committee Report were taken into consideration. The Kothari Committee - 1966, identified that the affiliating system led to large inefficiencies and contributed substantially to the widening gap of India's quality of education with respect to global standards. The delay in decision making process by universities as they struggle to manage the numerous colleges affiliated to them, the rigid academic curricula which has not been revised as per changing trends, economic needs and tastes of students, the stagnant, low level of research carried out in colleges and the lack of global competitiveness in the wake of increased number of foreign universities establishing their institutes in India are some of the problems identified by the committee in its report submitted to the Government of India in 1966.

The UGC defines autonomy to be a functional status conferred upon colleges by it, granting them greater flexibility towards purely academic

development for the upliftment of academic standards and excellence. The Government encouraged the granting of the status of autonomy to more colleges as suggested by the Kothari Committee Report. The Madras University was the first University to grant the status to colleges affiliated to it.

Functions of Autonomy

A college on being granted the status of autonomy is separated from its parent university, though not completely. The extent of autonomy depends on the kind of status granted to it. There are three broad classifications of autonomy

Academic Autonomy

Academic autonomy helps the college achieve the primary goal of granting autonomy. It enables the college to design its own curricula and devise its own methods of teaching. It also enables the college to design its own method of evaluation. Academic autonomy confers upon the college granted this status the right to

- Formulate its own curricula based on relevance
- Revise existing curricula based on relevance
- Introduce new courses based on relevance and demand
- Conduct examinations
- Publish results
- Introduce new systems like the choice-based credit system

Academic autonomy is considered to benefit higher education as it enables the college to keep up with its potential without being constrained by the common systems proposed by the university.

Academic autonomy permits the college with greater potential to improve its quality of education as under the previous system, such colleges suffered, as the university made common systems that could be followed by all colleges, and the college with greater potential found it impossible to realize

its capabilities. Academic autonomy does not permit the college to grant degrees, which is continued to be granted by the parent university. The university also plays an important role in ensuring that the quality of existing as well as newly introduced course is good.

Administrative Autonomy

Administrative autonomy enables the faculty to participate in the decision-making process of the college. These decisions were earlier taken by the parent university and pertain to the general administrative functioning of the college, including working hours and infrastructure.

Financial Autonomy

Financial autonomy enables the college to allocate its funds, including the UGC grants. It enables the college to generate internal funds through the introduction of self-financing courses and to allocate funds granted to it by the UGC and the State in ways it deems fit. The parent university closely watches the allocation and utilization of grants received by the college. Financial autonomy permits the college to set the fees for its self-financing courses. The direct payment agreement between the Government and aided colleges is upheld even after conferring financial autonomy to a college to ensure that it does not remain skeptical of increasing financial burden upon being granted the status of autonomy.

Importance of the Study

This study tries to analyses the student's perceptions about curriculum of autonomous colleges and to list out the problems associated with curriculum innovation by student community in autonomous colleges. The study measured to student's attitude towards functions autonomous institution in the field of curriculum development and its uses. Provisionally this study found that majority of the students of autonomous colleges get high marks in higher secondary education, sound parental education background, participation of various extracurricular activities in their academic performance. Autonomous

colleges facing various problems related academic reform i.e. financial, examinations standards, academic reforms, etc. A careful approach to these problems and a meticulous planning of strategies to tackle the challenges will definitely make the autonomous system an effective way of building knowledge-based society.

Objective of the Study

- The study measured to student's attitude towards functions autonomous institution in the field of curriculum development and its uses.
- To examine the subject knowledge of autonomous college students in Thoothukudi District.

Source of Data

The data and information for the purpose of the study have been collected through primary and secondary sources. The primary data has been collected by administering structural questionnaires. Primary data collected during November 2017. Data collected from 75 students of autonomous colleges in Thoothukudi District. Secondary data collected from UGC records and reports.

Students Perception of Autonomous College

In Thoothukudi District two autonomous colleges are functioning under affiliation with Manonmaniam Sundaranar University. In the year of 2009-10 academic year St. Mary's College granted autonomy from UGC and 2016-17 academic year Pope's College reached autonomous status. These two colleges come under the religious Christian minority institutions. The two colleges are served to the rural student community. Students are hails from vulnerable societies in general majority of them are first graduate from their families in particular.

Table – 6.1 Analyses to the student's perceptions among autonomous colleges. Nearly 56 percent of the students are strongly agreed to good reputation of the institution because reputation are getting from autonomous status of the college. In the context of selecting of the degree courses by students 85.33 per cent were consider that employability of the course and 90.66 per cent of the students are consider the institution offers a variety of courses in students' field of interest.

Table – 6.1

Students Perceptions about Autonomous College

Sl.No	Statements	1	2	3	4	5	Total
1	The institution has a good reputation for academic excellence.	42	33	-	-	-	75
2	The course I have chosen has a good reputation.	56	08	02	09	-	75
3	The institution offers a variety of courses in my field of interest.	68	07	-	-	-	75
4	A large number of alumni had acquired jobs in their respected fields.	14	47	03	11	-	75
5	The institution offers various extracurricular activities in a regular basis.	71	04	-	-	-	75
6	The institution has clear cut rules and regulations.	41	12	14	08	-	75
7	The institution's admission system is highly competitive.	64	09	-	2	-	75

8	The institution has a good reputation for high technology in all its infrastructure and teaching and learning facilities.	11	52	12	-	-	75
9	The Institution syllabi are updated periodically	69	06	-	-	-	75
10	The institution has a good reputation for producing quality graduates.	58	17	-	-	-	75

Source: Primary Data, 2017.

Note: 1- Strongly Agree 2 - Agree 3 - No Opinion 4- Disagree 5 - Strongly Disagree

All the respondents are focused to the various extra-curricular activities offered by colleges such as NCC, NSS, Youth Red Cross, Red Ribbon Club, Cultural Clubs and Sports. Autonomous college's students are actively participated in all extra- curricular activities in their academic performance because autonomous colleges are giving more freedom in other academic activities.

For example, in the month of October, 2017 Department of Economics, Wavoo Wajeeva College of Arts and Science for Women organized Economics Festival – 2017 most of prize winners are from autonomous colleges not only for this one function if considered all extra-curricular activities autonomous colleges students were top listed in prizes distribution.

Almost 54.66 per cent of students are considering about clear cur rules and regulations of college admission and academic performance. The observation of 85.33 per cent of the students by institution admissions system are highly competitive and all the students are focused about institution syllabi are updated periodically in general and unit wise updated/added of current issues or topics in particular.

Most of the students are such as 69.33 percent are considering about the institution has a good reputation for using of high technology in all its

infrastructure and teaching and learning facilities and 77 percent of the students are focused the institution has a good reputation for producing quality graduates.

Discussions of this Research Experience

Students are very important in knowledge transformation and pillars of our nation. Results of the study reveal that much emphasis has been placed on students' perceptions of the autonomous colleges are given more academic freedom of their career. Students who are studied autonomous colleges their performed better in extra-curricular activities.

The research revealed that students are considering syllabi of colleges because of most of the autonomous colleges are updating and adding new subject in their syllabi once in three years and twice in a year updating their syllabi in subject/unit wise. The functioning of autonomous colleges is given academic freedom, quality of the syllabi, high standard of examination question pattern, evaluation methods are highly appreciable, students participation of syllabi creation, faculties get freedom of make a new syllabus or updated/adding new title/topic may be include in their handling subjects.

Conclusion

It is seen that academic autonomy has been implemented well in colleges with respect to the conduct of examinations and evaluations. The autonomous colleges have successfully conducted credible examinations and published results on time, much to the satisfaction of the students. The universities have not been able to publish results on time, resulting in delays up to an academic year or more, under the affiliation system.

Though it is necessary to ensure the quality of academics in autonomous colleges, making university approval mandatory defeats the very purpose of academic autonomy. While most teachers and students feel that granting academic autonomy is a much-needed change to the affiliation system,

under which performance of colleges deteriorated year after year, it did not stop them from pointing out that the autonomy enjoyed by colleges in Tamil Nadu is glaringly inadequate. They cited the interference of the university in introducing and restructuring courses to point out that academic autonomy as implemented in Tamil Nadu ensure limited freedom even in terms of academic matters.

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A Study on ICTs Among Arts and Science Colleges in Kanyakumari District

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"ICT" is the Information and Communication Technologies. ICT is a medium of teaching and learning. Nowadays, it is becoming increasingly popular among colleges. In simple words, it is the use of computers, internet, laptops and projectors in the field of education. The application of ICT provides vast array of powerful tools that may help in transforming the present isolated, teacher- centered and text- bound classroom into rich student–focused, interactive knowledge environment. Teachers must have knowledge and skills to use the new digital tools and resources to help all students achieve high academic standards. The use of ICTs can change learner's perception and understanding of the content. Worldwide research has shown that ICT can lead to improved student learning and better teaching methods. This paper focuses on study of ICTs among arts and science colleges in Kanyakumari District. A report made by the National Institute of Multimedia Education in Japan, proved that an increase in student exposure to educational ICT through curriculum integration has a significant and positive impact on student achievement, especially in terms of "Knowledge Comprehension" · "Practical skill" and "Presentation skill" in subject areas such as mathematics, science, and social study.

Keywords: Communication technology, Multimedia Education and Power point.

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Introduction

The education systems around the world are under increasing pressure to use ICT to enhance the knowledge of skills and students in the ensuing years of the 21st century. Power point presentations engages both right and left brained thinkers during lecture, which promotes self-paced learning. Through ICT, students can experience various stages of learning such as critical thinking, problem solving, guided instruction, group monitoring etc.

Advantages

- Through ICT, images can easily be used in teaching and improving the retentive memory of students.
- Through ICT, teachers can easily explain complex instructions and ensure students' comprehension.
- Through ICT, teachers are able to create interactive classes and make the lessons more enjoyable, which could improve student attendance and concentration.

Disadvantages

- Setting up the devices can be very troublesome.
- Too expensive to afford
- Hard for teachers to use with a lack of experience using ICT tools

Objectives of the Study

- To find out the various ICT facilities in arts and science colleges
- To find out the influence of ICT facilities especially internet in increasing the academic efficiency of students
- To find out if there is difference of opinion between the students of Arts& Science and B.Ed. regarding the benefit of using Information Communication Technologies
- To identify the problems encountered by the students in using ICT facility

Methodology

The present study was undertaken in Kanyakumari District of Tamil Nadu with special reference to 3 colleges. Major input for the study was obtained through survey Method. The questionnaires were distributed among a sample of 75 Arts & Science students selected at random from three colleges in Kanyakumari District.

Analysis 1

Questionnaire distribution among college students

Gender	Questionnaire distribution	% distribution
Male	45	60
Female	30	40
Total	75	

Out of 75 questionnaires, the respondents are 45 male students and 30 female students

Analysis 2

ICT facilities in various Arts & Science Colleges

ICT facilities	Yes	No
Computer	60	15
Projectors	55	20
Internet connection usage	60	15
Smart phone	35	40
CCTV cameras	30	45
Laptop usage	50	25

Most of the students avail facilities like computer, projectors, internets and laptops for studying and completing their home works available in their college premises

Analysis 3

Knowledge of usage of different ICT tools

Gender	Pen drive	scanner	Internet Accessing	Email	Social media	Online Games
Male	50	30	50	40	45	55
Female	22	10	20	10	15	10
Total	72 (96%)	40 (53%)	70 (93%)	50 (66%)	60 (80%)	65 (87%)

Most of the male and female students are using pen drives, internet and playing online games

Analysis 4

Level of confidence in doing computer tasks

	Never	Rarely	Sometimes	Often	Always
Work in text using word processor program	4	8	5	18	40
Search internet to collect information	2	5	15	15	38
Use spreadsheet programmes like Excel	15	10	30	12	8
Create a database	20	30	7	10	8
Install software	5	12	23	14	21
Take printouts	5	10	10	45	5
Create power point slides	12	8	15	30	10
Download/upload materials from website	11	3	15	36	10
Edit images	10	30	12	14	9

Calculating mean=75/2=37.5

Working in text using word processor program, searching internet to collect information, taking printouts, downloading uploading materials from websites, creating power point slides is often done. Using spreadsheet programmes like excel, installing software is sometimes done. Creating database, editing images is done rarely

Analysis 5

Null Hypothesis: There is no difference of opinion between the students of Arts& Science and B.Ed. regarding the benefit of using Information Communication Technologies

Alternative Hypothesis: There is difference of opinion between the students of Arts& Science and B.Ed. regarding the benefit of using Information Communication Technologies

Benefit of using ICTs	Students			Total
	Arts	Science	B.Ed.	
Yes	25	18	12	55
No	5	9	6	20
	30	27	18	75

Reference: Primary Data

$E_{11} = \frac{RT * CT}{N}$

$= \frac{55 * 30}{75} = 22$

Expected Frequencies

22	19.8	13.2
8	7.2	4.8

O	*E*	*O-E*	$(O-E)^2$	$(O-E)^2/E$
25	22	3	9	0.4091
18	19.8	-1.8	3.24	0.1636
12	13.2	-1.2	1.44	0.1090
5	8	-3	9	1.125
9	7.2	1.8	3.24	0.45
6	4.8	1.2	1.44	0.3

$$\chi_c^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Degree of freedom = (r - 1) (c - 1) = (3-1) (2-1) =2*1=2

The critical value of X^2 with 2 degree of freedom is 5.99. Since 2.5567 < 5.99, therefore we accept the null hypothesis and conclude that there is no difference of opinion between the students of Arts& Science and B.Ed. regarding the benefit of using Information Communication Technologies at 5% level of significance.

Analysis 6

Problems in usage of ICT facilities

	Male	Female	Total
Server shutdown	42	39	81
Current cuts	55	32	87
Eye problems	35	25	60
Back pain	25	30	55
Others	14	28	42

It is found that current cuts and server shutdown are the main problems in usage of ICT facilities

Suggestions

- Students should have access to various ICT tools to cope up with the new environment
- Assignments should be given to students such that they have to access internet and collect information to increase knowledge
- The colleges should conduct computer courses so that each and every department will be aware of ICT programmes
- The colleges should be equipped with modern ICT facilities
- Computer labs should be installed with various multimedia software.

Conclusion

ICT is undoubtedly a boon in the field of education. The full benefit of the technology can be realised only by enhancing the technology skill of both faculty and students. Multimedia packages helps to present information in aesthetically more attractive methods turning classrooms into interactive sessions

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Hypertext and Learning: A Conceptual Approach to Digital Pedagogy

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This paper explores the possibilities of digital technology in pedagogy and educational planning. Hypertext/hypermedia and its use in teaching-learning process are discussed to understand the modern methods of knowledge construction and knowledge transference. Conventional pedagogy under pins a linear kind of knowledge transference, whereas in hypertext, knowledge is transferred in a non-linear mode. Studies show that hypertext can be extensively used in pedagogy. As a case in point this paper examines the use of hypertext in medical education.

Keywords: Hypertext, Courseware, Net Learning, and Digital Pedagogy.

Introduction

The dawn of twenty first century opens new vistas in creativity and innovation in teaching learning process. This is happening as a result of the introduction of technology in education process, especially ICT. Introduction of ICT in invigorating pedagogies across curricula has become the focus of researchers at present. Digital pedagogy has opened up new areas of structural frame work in all disciplines and branches of knowledge.

The importance of ICT as such has created new concepts and visions and the world now, we live in is literally called a world with multiple knowledge societies. Knowledge is constructed and transmitted through innovative technological contributions, which promoted to the development of a networked society. Herein, knowledge is generated and transferred with the help of new technologies in information processing. This paper attempts to present a descriptive study of constructive technologies for the use of classroom learning, giving particular focus to hypertext or hypermedia as it is called. Of the many net-Learning systems, the role of hypertext creation and writing has now paramount importance in designing digital tech-pedagogies. Hence, the basic research question in this paper will discuss the techniques of hypertext creation to make it useful for teaching learning process. Hypertext can be applied in all disciplines and the case in point will be from the field of medicine.

Background

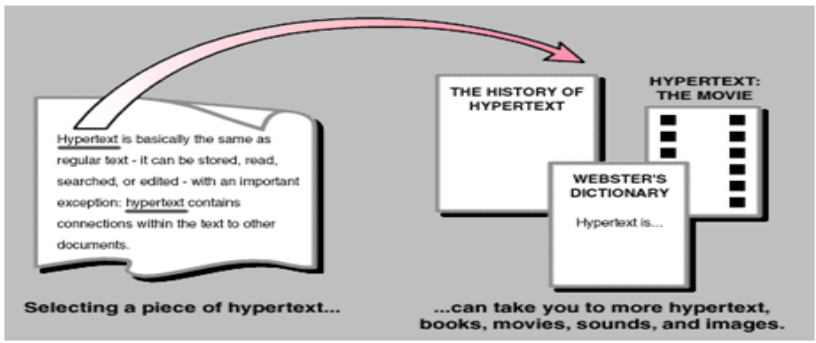
The notion of hypertext and the other forms of representation in a hypermedia environment are not discussed in extenso. However, many conceptual and empirical approaches to the study of hypermedia have been developed by researchers. In the year 1965, Theodor H Nelson coined the word 'hypertext'. The idea of a machine aided hypertext like system originated in the minds of Vannevar Bush in the year 1945 itself. Thus, Bush and Nelson showed the method of hypertext creation for individual demands.

Thereafter, the production of hypertext (HTML editors) became so easy and it was applied in teaching and learning extensively. Another major contribution is from Dillon and Gabbard in the year 1998, who compared hypertext with traditional texts and exhibited the methods of better learning outcomes from hypertext. Hayes and Flower developed a model of hypertext in which authors can engage in three types of activities, ie; text interpretation, reflection and text production. It was Bereiter and Scardamalia who developed a generalized approach to the writing of hypertext. They pointed out three basic features of the hypertext such as writing nodes, establishing links, and the total structure of the hypertext.

What is hypertext?

Hypertext is a digital text to store information in its multiple facets without any linearity as in the format of a traditional text. Hypertext keeps

information in a non-linear method wherein information is linked in a hierarchical manner. Multiple informative 'links' are provided in a text wherein the reader can choose varied information at the click of mouse at the same point of time. As such, information is not subjected to linearization and no priority presentation or information in order is brought about in a hypertext.



In simple terms, "hypertext is a concept of information management in which data is stored in a network of nodes connected by links" (K.Tochtermann). Hypermedia or Network based learning has now developed many platforms for education purpose. There are eduwares, such as the Moodle, Podcasts, Weblogs, Blogs, RSS, SMS, MMS, .com crash like google, ebay, with World Wide Web are the best examples. And the new generation will witness many more eduwares acting as the tutor, tutee and the tool in the classrooms. One cannot limit the technological advancements by suggesting only such examples, but explore the possibilities of each one of them in developing the software environments for the benefit of knowledge construction. So looking for a further development in eduwares and teaching modalities, this paper highlights some of the effectiveness of hypertext in teaching and selecting and sampling medical science as the case in point.

Hypertext and Pedagogy

Technology for pedagogy is a long drawn out idea ever since 1960s.ICT for teaching /learning purposes was conceived during the communicative language teaching renaissance itself. Afterwards, it was adopted by almost all disciplines as a pedagogical tool. The new generation of learners with their amplified interest in computer and net Learning welcomed a paradigm shift in

pedagogy and the teachers were forced to equip themselves to face the new challenges in the field of teaching/learning process.

Because of this new change, a lot of network-based teaching concepts and practice obtained wide currency in education. During 1960s itself new terms and concepts such as computer assisted instruction, computer-based learning, courseware were coined by experts in the field. During this period, itself the benefits of hypermedia based educational software were realized and educational institutions started exploiting the benefits of network-based learning.

Hypertext and the Learner

The question of how we make use of hypermedia for teaching/learning process in the medical discipline will be examined in this paper as a case in point. The traditional classroom teaching and the reading from huge volumes of printed materials in the Medical institutions often drag the learner to drudgery and boredom. The medical content material with its nonlinear arrangement and its inter textual links draws the learner to motivation, creativity and initiative in learning. The learners of multiple intelligences can make use of their inherent capacity in learning by exploiting the hypertext links. All types of learners, for example, visual, kinesthetic, etc can convert learning as a meaningful experience in a technology bound learning environment. Most of the materials will be interactive and effective applications of computer based instruction can be served.

Some of the basic features of the hypertext may be examined so as to assess the effectiveness of the use of hypertext in the classroom. If learning is to be effective, there should be meaningful choice of materials and content for comprehension. Hypertext will provide flexibility in accessing the knowledge according to the need of the study. The student can control the learning process based on his interest and motivation. The hypertext reader can choose and find his own methods and ways of pleasure and entertainment in selecting the knowledge required and can easily assimilate the required content. Further, a hypertext learner can accumulate information on a particular topic from various perspectives. It becomes then quite common that a learner turns into a researcher throughout the period of study.

A hypertext learner becomes a global learner instead of a narrow book-canvas learner. Multiple texts are available to him at the same point of time and he could navigate through multiple frames of information. And at the same time, more metacognitive requirements are demanded from the learner that he has to select, process, assimilate and scroll through the required text. The

learner becomes a macro learner and not confined within the walls of the classroom.

Hypertext and Medical Education

This paper discusses the use and applications of hypertext in medical education. It has been reported that researchers in hypertext for the benefit of medical diagnosis and its effectiveness have not been much identified so far. In the conventional medical diagnosis, the physician gathers data and uses it for hypothesis and arrives at decisions. Thus, it becomes a deductive kind of clinical diagnosis using physical examination, laboratory analysis and analyzing the history of the patient; wherein a schematic and linear type of information gathering process takes place. In such diagnostic practice, the physicist is not able to hold multiple hypotheses at the same time because the human brain cannot hold multiple hypotheses at a juncture which creates complexity for diagnostic purposes. Most often, if a poor unskilled doctor collects irrelevant data and improbable hypotheses that may deter a proper medical diagnosis. In computer assisted clinical diagnosis, such problems will not occur. In hypertext, a number of nodes may provide the symptoms of the disease, laboratory findings, physical exam findings, related experiences of other doctors, research studies, etc, which are linked by specific patterns for a particular detection of disease.

At the touch of a button, after recording the specified symptoms and navigating through the links will provide the Doctor all information and diagnostic solutions. As for example, when a patient approach with joints pain, it might be examined and can be linked in comparison to various other symptoms and tested so that the possibility of multiple diseases can be identified easily.

By way of entering 'joints pain', the pattern in the hypertext will show many numbers of associations of joints pain with diseases such as arthritis, meningitis, malaria, fever, etc... or less likely diseases. However, it may not show any pattern probability with gastro-enteritis or cataract, or with no way related diseases. So, such pattern findings, identification and diagnosis will be more scientific and meaningful in hypermedia and related expert systems.

Another focus of the intended study is on the pedagogic systems in medical profession and the use of hypertext in context. Professional education,

especially in medicine at present is not prone to any dynamic or creative teaching methodologies; since doctor-teachers are not professionally trained in the art of teaching.

Hence, teaching-learning process becomes non-attractive in medical education. Therefore, the introduction of hypertext-based teaching may generate new eduwares consisting of multiple courseware and technological systems for the learning space of the classrooms which are attractive, creative and innovative. This new hypermedia- approach will be vibrant, productive and motivating for generating new learning environment in medical education in Kerala, India.

The varied facets of hypermedia show animations, illustrations, audio and video that make learning process pleasant and effective in the classroom. It can also create lively situations and real-life-learning situations. The digital hypermedia-teaching situation becomes a powerful tool as it gives more meaning and authenticity for learning materials. It can be used for any process teaching or procedural teaching. In order to explain a procedure, hypertext can present photos, animations and simulations that may help to demonstrate and illustrate the teaching/learning procedure. Such types of modalities of ICT technological tools for medical education can be exploited widely.

For example, hypermedia can be utilized for heartbeat measurement, recording images; taking medical pictures in context that serve as guides to procedural learning. A learning module for measurement of medical data and procedure of diagnosis can incorporate pictures and animations that enlist the real situations of the heartbeat, blood pressure, lung functioning, etc. In such situations, the learners can adopt a self-directed and experiential learning.

Conclusion

In a period of globalization, scholars, learners, policy makers and curriculum planners opt for an ambivalent attitude towards advanced pedagogies. Advanced pedagogies exploit both conventional and traditional standards and that of the digital technology. In a techno bulged world, both synchronous and asynchronous methods of knowledge gathering are adopted. Curricula across the world advocate dialectical interactions, digital discourse, self-directed learning, experiential approaches and advanced dialogues within the classroom boundaries. Innovative ideas for bridging the gap between the conventional and glocalized approaches in teaching have contributed to hypertext/hypermedia in edu-technology. The future of educational planning

will be mostly controlled by scientific innovations for the new generation learners.

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Attitudes and Skills in Learning

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Hard work in learning will not produce fast progress. Instead use of skills in learning will be effective in getting results. Positive attitude helps in learning process. Learning occupies a very important place in our life. The 21st century learning skills are often called the 4 C's: critical thinking, creative thinking, communicating, and collaborating. These skills help students learn, and so they are vital to success in school and beyond.

Keywords: Communicating, Collaborating, Attitude and Creative Thinking.

Introduction

Hard work in learning will not produce fast progress. Instead use of skills in learning will be effective in getting results. Attitudes are evaluations people make about objects, ideas, events, or other people. Attitudes can be positive or negative. Explicit attitudes are conscious beliefs that can guide decisions and behavior. Implicit attitudes are unconscious beliefs that can still influence decisions and behavior. Positive attitude helps in learning process.

Learning occupies a very important place in our life. Most of what we do or not do is influenced by what we learn and how we learn it. Learning therefore provides a key to the structure or our personality and behavior. The 21st century learning skills are often called the 4 C's: critical

thinking, creative thinking, communicating, and collaborating. These skills help students learn, and so they are vital to success in school and beyond.

Critical Thinking

Critical thinking is the process we use to reflect on assess and judge the assumption underlying our own and others ideas and efforts. It is focused, careful analysis of something to better understand it. It helps a person in stepping aside

from his own personal beliefs, prejudices, and opinions to sort out the facts and discover the truth, even at the expense of his basic belief system. When people speak of "left brain" activity, they are usually referring to critical thinking. Here are some of the main critical-thinking abilities:

- Analyzing is breaking something down into its parts, examining each part, and noting how the parts fit together.
- Arguing is using a series of statements connected logically together, backed by evidence, to reach a conclusion.
- Classifying is identifying the types or groups of something, showing how each category is distinct from the others.
- Comparing and contrasting is pointing out the similarities and differences between two or more subjects.
- Defining is explaining the meaning of a term using denotation, connotation, example, etymology, synonyms, and antonyms.
- Describing is explaining the traits of something, such as size, shape, weight, color, use, origin, value, condition, location, and so on.
- Evaluating is deciding on the worth of something by comparing it against an accepted standard of value.
- Explaining is telling what something is or how it works so that others can understand it.
- Problem solving is analyzing the causes and effects of a problem and finding a way to stop the causes or the effects.
- Tracking cause and effect is determining why something is happening and what results from it.

Creative Thinking

Creative thinking is the process we use to develop ideas that are unique, useful and worthy of further elaboration. It is expansive, open-ended invention and discovery of possibilities. When people speak of "right brain" activity, they most often mean creative thinking. Here are some of the more common creative thinking abilities:

- Brainstorming ideas involves asking a question and rapidly listing all answers, even those that are far-fetched, impractical, or impossible.
- Creating something requires forming it by combining materials, perhaps according to a plan or perhaps based on the impulse of the moment.
- Designing something means finding the conjunction between form and function and shaping materials for a specific purpose.
- Entertaining others involves telling stories, making jokes, singing songs, playing games, acting out parts, and making conversation.
- Imagining ideas involves reaching into the unknown and impossible, perhaps idly or with great focus, as Einstein did with his thought experiments.
- Improvising a solution involves using something in a novel way to solve a problem.
- Innovating is creating something that hasn't existed before, whether an object, a procedure, or an idea.
- Overturning something means flipping it to get a new perspective, perhaps by redefining given, reversing cause and effect, or looking at something in a brand-new way.
- Problem solving requires using many of the creative abilities listed here to figure out possible solutions and putting one or more of them into action.
- Questioning actively reaches into what is unknown to make it known, seeking information or a new way to do something.

Communicating

Communication (from Latin communicate, meaning "to share) is the purposeful activity of information exchange between two or more participants in order to convey or receive the intended meanings through a

shared system of signs and semiotic rules. The basic steps of communication are the forming of communicative intent, message composition, message encoding, transmission of signal, reception of signal, message decoding and finally interpretation of the message by the recipient.

- Analyzing the situation means thinking about the subject, purpose, sender, receiver, medium, and context of a message.
- Choosing a medium involves deciding the most appropriate way to deliver a message, ranging from a face-to-face chat to a 400-page report.
- Evaluating messages means deciding whether they are correct, complete, reliable, authoritative, and up-to-date.
- Following conventions means communicating using the expected norms for the medium chosen.
- Listening actively requires carefully paying attention, taking notes, asking questions, and otherwise engaging in the ideas being communicated.
- Reading is decoding written words and images in order to understand what their originator is trying to communicate.
- Speaking involves using spoken words, tone of voice, body language, gestures, facial expressions, and visual aids in order to convey ideas.
- Turn taking means effectively switching from receiving ideas to providing ideas, back and forth between those in the communication situation.
- Using technology requires understanding the abilities and limitations of any technological communication, from phone calls to e-mails to instant messages.
- Writing involves encoding messages into words, sentences, and paragraphs for the purpose of communicating to a person who is removed by distance, time, or both.

Collaborating

Collaborative learning is a method of teaching and learning in which student's team together to explore a significant question or create a meaningful project. A group of students discussing a lecture or students from different schools working together over the Internet on a shared assignment are both examples of collaborative learning.

- Allocating resources and responsibilities ensures that all members of a team can work optimally.
- Brainstorming ideas in a group involves rapidly suggesting and writing down ideas without pausing to critique them.
- Decision-making requires sorting through the many options provided to the group and arriving at a single option to move forward.
- Delegating means assigning duties to members of the group and expecting them to fulfil their parts of the task.
- Evaluating the products, processes, and members of the group provides a clear sense of what is working well and what improvements could be made.
- Goal setting requires the group to analyses the situation, decide what outcome is desired, and clearly state an achievable objective.
- Leading a group means creating an environment in which all members can contribute according to their abilities.
- Managing time involves matching up a list of tasks to a schedule and tracking the progress toward goals.
- Resolving conflicts occurs from using one of the following strategies: asserting, cooperating, compromising, competing, or deferring.
- Team building means cooperatively working overtime to achieve a common goal.

Conclusion

Positive attitude and skills in learning bring good results among learners. Critical thinking, creative thinking, communicating, and collaborating are important skills in learning.

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Safeguarding Women from The Clutches of Domestic Violence and Sexual Abuse

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Social conventions play an important role in the continuance of the phenomenon of child prostitution. These include child marriages, polygamy, dowry and social stigma against single, unwed, divorced women and girls who have been sexually abused (Trade in Human Misery, 1998). Children, especially young girls, in these circumstances are especially vulnerable to the prostitution racket. There have been instances of girls being driven into the sex trade following traumatic sexual experiences during childhood, including rape. If, in the case of Shahida of Kozhikode, it was the violence inflicted by her father's younger brother followed by molestation by her cousin and men rape (The Hindustan Times, 2 Oct 1998), Lakshmi's tale of woe began when she was raped by her step father at age 8 and her further sexual exploitation for food when she left home (Uniya1,1998). Prostitution thus becomes a viable option for children who have been abandoned, for those from disrupted families and for those who are financially supporting their families.

Keywords: Women, Domestic Violence, Sexual Abuse and Prostitution.

The Family

Women have emerged as the most significant agents of change in the struggle against gender-based violence. While women's organizations have

played a critical pole (see section on civil society), the collective strength and courage of individual women has been notable in fighting many forms of violence. Poor and often illiterate, these women have managed to mobilize hundreds of other women, raised resources, designed strategies and forced policy-makers to revise laws and policies.

A systematic effort has to be made to listen to the voices of grassroots women and survivors of domestic violence, and to incorporate solutions they have to offer. Their perspectives will provide valuable lessons in making programmes and services effective and targeted to their needs.
Women need to be empowered through education, employment opportunities, legal literacy, and right to inheritance. Human rights education and information regarding domestic violence should be provided to them because this is a matter of their absolute rights.

Human rights education and information regarding violence should be provided to them because this is a matter of their absolute rights. Integrated supportive services, legal intervention and redress should be made available in situations of domestic violence. Assistance to help women rebuild and recover their lives after violence should be part of the intervention strategy, including counselling, relocation, credit support, and employment.

Consistent support for women must be provided by all relevant sectors - the criminal justice system, health, welfare, and the private sector. Support must also be available to women via informal networks such as family, friends, neighbours, and local community groups. Community groups and government institutions should be trained to identify women, men, adolescent boys and girls, and children at risk of domestic violence, and to refer them to confidential and accessible services. Where such services are not available, communities must be helped to establish local culturally appropriate mechanisms to support women.

Children need to be identified as victims of domestic violence, and their safety has to be ensured. This requires ensuring the safety of their mothers and making childcare facilities available to women in shelters. The community and the state to assist children to recover from the violence and abuse they have suffered and/or witnessed should develop appropriate programs.

Domestic Violence

Physical violence as well as explicit forms of aggression are used by the more powerful in the household as methods to ensure obedience of the less powerful and therefore related to power dynamics in a household. At every stage in the life cycle, the female body is both the objects of desire and of control (Thapan 1997).

Domestic violence includes not only inter-spousal violence, but also violence perpetrated by other family members. Generally, an important part of the power relationship between spouses and their families relates to dowry and its ramifications (Karlekar, 1995).

There is a wide societal tolerance for wife-abuse, which is very often even considered justifiable under certain circumstance: Disputes over dowry, wife's sexual infidelities, her neglect of household duties, and her disobedience of her husband's dictates are all considered legitimate causes for wife-beating. It is only when the torture becomes unbearable or death appeared imminent that most women appeared willing to speak out (Karlekar, 1995).

Glass defines domestic violence as "anything that is experienced as fearful, controlling and threatening when used by those with power (invariably men) against those without power (mainly women and children)" (Ravindran, 1991).

Domestic violence includes, harassment, maltreatment, brutality or cruelty and even the threat of assault - intimidation. It includes physical injury, as well as "willfully or knowingly placing or attempting to place a spouse in fear of injury and compelling the spouse by force or threat to engage in any conduct or act, sexual or otherwise, from which the spouse has a right to abstain". Confining or detaining the spouse against one's will or damaging property are also considered as acts of violence (BediK, 1999).

Violence Against Women

Violence against women is the most disturbing consequence of cultures which tolerate unequal relations between the sexes. In launching his 2008 campaign, Unite to End Violence Against Women, UN Secretary-General Ban Ki-moon observed that "at least one out of every three women is likely to be

beaten, coerced into sex or otherwise abused in her lifetime."Examples of appalling gender-based violence extend beyond the smokescreen of poverty and war.None is more horrifying than the practice of sex-selective abortion and female infanticide, associated particularly with China and India.

Sexual Harassment at Work

According to Mac Kinnons (1979) sexual harassment of working women is primarily a problem faced by women than men rarely face this problem and therefore it should be considered a form of sex discrimination (Sikri, 1999:128). Sexual harassment as defined by the court stipulates:

- Such unwelcome sexually determined behaviour (whether
- directly or by implication) as physical contact and advances,
- A demand or request for sexual favours, sexually coloured remarks,
- Showing pornography and any other unwelcome physical, verbal or nonverbal conduct of sexual nature.

Burt (1980) says "unwanted sexual overtures", has the virtue of parsimony but necessarily concerns intentions and motivation, not just overt behaviour. Defining sexual harassment as unwanted sexual overrules has the same problem inherent in defining rape as unwanted sexual relations. In practice the woman has to prove that the sexual relations or the sexual overtures were unwanted (Sikri, 1999: 128). The male colleague will go out of the way to prove that the woman is of loose character (Ibid. 40).

According to Quinn (1977) defining sexual harassment means setting boundaries on the term and differentiating sexual harassment from expressions of sexual interest. Not all expressions of sexuality in me workplace could possibly be called sexual harassment.

Men and women do meet dating partners and future spouses at work. Some people may even enjoy sexual jokes and flirting that can be ego enhancing and enrich their fantasy life.

Physical abuse

A growing body of research studies confirms the prevalence of physical violence in all parts of the globe, including the estimates of 20 to 50 per cent of women from country to country who have experienced domestic violence. Statistics are grim no matter where in the world one looks. Data from industrialized and developing countries as well as from transitional countries provide an overview of the global problem. The data in this table focus only on physical assault. There are few comparable statistics on psychological violence, sexual abuse, and murder of women at the hands of intimate partners and other family members. As already mentioned, physical violence is usually accompanied by psychological abuse, and in many cases by sexual assault.

Sexual abuse and rape in intimate relationships

Sexual abuse and rape by an intimate partner are not considered a crime in most countries, and women in many societies do not consider forced sex as rape if they are married to, or cohabiting with, the perpetrator. The assumption is that once a woman enters into a contract of marriage, the husband has the right to unlimited sexual access to his wife. Surveys in many countries reveal that approximately 10 to 15 per cent of women report being forced to have sex with their intimate partner. Some countries have begun to legislate against marital rape. These include Australia, Austria, Barbados, Canada, Cyprus, Denmark, the Dominican Republic, Ecuador, Finland, France, Germany, Ireland, Mexico, Namibia, New Zealand, Norway, the Philippines, Poland, Russia, South Africa, Spain, Sweden, Trinidad SI Tobago, the United Kingdom and the United States of America. Although provision of such laws represents considerable progress, it is often difficult for a woman to press charges because of the evidential rules concerning the crime.

Psychological and emotional abuse

Because psychological violence is harder to capture in quantitative studies, a full picture of the deeper and more insidious levels of violence defies quantification. Victim-survivors report that ongoing psychological violence - emotional torture and living under terror - is often more unbearable than the physical brutality, with mental stress leading to a high incidence of suicide and suicide attempts. A close correlation between domestic violence and suicide has been / established based on studies in the United States, Fiji, Papua New

Guinea, Peru, India, Bangladesh and Sri Lanka. Suicide is 12 times as likely to have been attempted by a woman who has been abused than by one who has not. In the United States, as many as 35 to 40 percent of battered women attempt suicide. 10 In Sri Lanka, the number of suicides by girls and women

Conclusions

All studies on the costs of violence against women have the same goal and use the same accounting model. Differences arise in the details of how the research is carried out and the jurisdiction to which it applies, rather than the questions asked or approach taken. Although each research project has attempted to reach the same challenging goal, the data resources available to them vary widely. This, more than anything, determines the differences in how researchers have approached the techniques of the common goal of estimating a nation's costs of violence against women. The costs of violence against women are enormous. Economic development is limited as long as violence against women exists. All of the economic costing literature indicates that the whole of society pays for the costs of not addressing this pressing social concern. The sooner that countries bring in effective policies and programs to end violence against women, the sooner they will begin to reduce the economic cost of that violence to their society and benefit in the long run.

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