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EFFECTIVENESS OF ICT INTEGRATED TEACHING IN DEVELOPING HIGHER ORDER THINKING SKILLS AMONG STANDARD VIII STUDENTS IN SCIENCE

Bhujendra Nath Panda
Monalisa Dash

n the process of transitioning from teacher-centred instruction to learner-entred instruction, Information and Communication Technology (ICT) plays vital role. In this background, the investigators conducted this study to 'etermine the effectiveness of ICT integrated teaching in developing the Higher)rder Thinking Skills (HOTS) among standard VIII students in science. The nvestigators employed a Quasi –Experimental method. The sample consisted f 76 students of class VIII selected purposefully from the students of Govt irls' high school, Unit-IX, Bhubaneswar. A self - developed achievement est consisting of 25 items were used to measure the HOTS of students. The tudy found that i) there is no significant difference between pre-test scores of xperimental group and control group in science achievement at 0.01 level, i)) there is a significant difference between post-test scores of experimental group and control group in science achievement at 0.01 level, iii) there is a ignificant difference between gain scores in analysing, evaluating and creating kills of experimental group and control group in science achievement at 0.01 evel, iv) there is a significant difference between gain scores of slow learners of xperimental group and control group in science achievement at 0.01 level. The tudy has implications for facilitation in higher order of inquiry processes and mprovement of slow learners.

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Efficiency of Aliquat 336 for hydrometallurgical separation of Sm (III) and Co (II) from nitrate medium

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ABSTRACT

The recovery of rare earths elements (REEs) has become crucial due to their extensive use in progressive technologies. Processing of end-of-life products such as nickel-metal hydride batteries, permanent magnets and fluorescent lamps have turn out to be necessary because REEs are of limited availability due to growing demand. The present research deals with the study of separation of Sm (III) and Co (II) from nitrate medium using Aliquat 336 blended with propanol as modifier and kerosene as diluent. The effects of pH, nitrate ion, Aliquat 336 concentration, diluents, temperature and phase volume ratio on the separation of two metal ions have been examined. Extraction of Sm (III) increases with increase in pH, nitrate ion concentration and Aliquat 336 molarity. Extraction isotherm shows three theoretical stages for complete extraction of Sm (III) in presence of Co (II). Increase in shaking time and temperature have positive influence on the extraction process and complete stripping of Sm (III) has been achieved using 0.01 mol/L hydrochloric acid.

1. Introduction

In recent decades, the field of rare earth elements (REEs) has transfixed researchers throughout the world due to their enormous importance for green and low-carbon economy. REEs are currently regarded to be among the most critical elements and have got considerable usage in electric car motors, wind hydropower generators, nickel metal hydride batteries, lithium ion batteries, catalysts, computer hard drives, luminescent screens etc. They are also used in nuclear reactors, surgical instruments, missile parts, defence technologies and many more (Xie et al., 2014; Makanyire et al., 2016; Binnemans et al., 2013). So the recycling of consumer goods at end-of-life is requisite to afford the increasing demand of today's generation. Recycling of REEs is the best complementary approach to get rid of the so-called "Balance Problem" (Haque et al., 2014). In recent studies emphasis is given on the recovery and recycling of REEs to ensure the forthcoming demands with endorsement as well as minimal environmental pollution. Permanent magnets like Samarium-cobalt (SmCo) and Neodymium-iron-boron (NdFeB) composed of rare earth elements are pulling eyesight because of their wide range of applications like military technologies, missiles, aircrafts etc. Unlike NdFeB permanent magnet, the magnetic strength of SmCo magnets remains unchanged at high temperature (Gutfleisch et al., 2011). During the production of SmCo magnets, nearly 15–30% of raw material is wasted as scraps due to finishing and polishing. There are about 30–40% Sm, 50–60% Co in a typical samarium cobalt magnet scrap along with traces of other metals like Cu, Fe, Ni, Zr (Liu and Chinnasamy, 2012). So recovery of metals from these magnetic scraps and spent magnets can be considered as the superfine alternative source of value added metals like Sm and Co. A number of studies based on recovery of Nd, Fend other metals from spent sintered NdFeB magnets/sludge have been reported (Dupont and Binnemans, 2015; Lee et al., 2013; Lyman and Palmer, 1993; Riano et al., 2017; Sun et al., 2018). The separation of samarium and cobalt from their leached solution using Cyanex 572 as extractant diluted in kerosene was carried out (Sinha et al., 2017). They adopted four stages like acid leaching, solvent extraction, precipitation and calcination to recover samarium oxide (Sm_2O_3) and cobalt oxide (Co_3O_4) from SmCo magnet scrap. Solvent extraction is the most valuable method used for the separation and purification of rare earth elements from transition metals in the field of hydrometallurgy (Tunsu et al., 2016). This is due to its speed, wide scope and effectiveness at micro and macro level. The selectivity of extractant and relative solubility of the complexes formed by the metal with extractant plays a decisive role in the separation of metal ions (Rydberg et al., 2004). The chelator - induced recovery of rare earths from the end of life fluorescent lamps with the help of mechano-chemical energy have been performed (Hasegawa et al., 2018). Using ionic liquids as extracting agents, separation of rare earths from fluorescent lamp wastes have also been carried out (Pavon et al., 2018). The waste

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Review

A review on the recovery and separation of rare earths and transition metals from secondary resources

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ABSTRACT

The continuous miniaturization of modern green and advanced technologies is increasing the demand of rare earth elements (REEs). Consequently, REEs are listed as the critical metals concerning their crucial role for a clean environment. However, their resources are limited which in turn disrupt their supply chain. To tackle the supply issue and to meet future demand, there is need to exploit recycling schemes for the recovery REEs from secondary resources. This review describes comprehensively various processes developed for the separation of REEs and transition metals from secondary resources. It focuses on the hydrometallurgical route, especially solvent extraction employed to separate REEs and transition metals from potential wastes originated from different industries. The use of different commercial extractants for the recycling purposes and mechanisms involved in the extraction has been discussed in detail.

Contents

1. Introduction

Rare earths in recent times have received much attention for

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Unsymmetrical Disulfides Synthesis via Sulfenium Ion

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Abstract: An umpolung approach for the synthesis of unsymmetrical disulfides via sulfenium ion is reported. In situ generated electrophilic sulfenium ion from electron-rich thiols reacted with second thiols to yield unsymmetrical disulfides. Using an iodine catalyst and 4-dimethylaminopyridine (DMAP)/water as promoter, the target syntheses were achieved in one pot under aerobic condition.

Organic disulfides are important functional moieties found in various marine natural products,[1] pharmaceuticals,[2] materials[3] and polymers.[4] Disulfides are also known for their odors especially in kitchen items, like in onions and garlics.[5] Pharmaceutically active disulfides are known to have anti-inflammatory,[6] antitumour,[7] antioxidants[8] and antiulcer[9] activities. Chemically, organo-disulfides are being used in catalyst,[10] in ligand designing,[11] towards producing fine chemicals and in functional group protections.[12] In addition, the concept of constitutional dynamic chemistry (CDC)[13] and dynamic combinatorial chemistry (DCC)[14] is documented using the chemistry of disulfides. Due to the reversibility nature of the disulfide bond, formation of many products could be possible when more than one thiol building blocks present in equilibrium.[15] Therefore, it's always challenging to synthesize selectively any unsymmetrical disulfides from mixture of thiols in one pot.[16]

In Figure 1 a, few examples of either pharmaceutically important or naturally occurring molecules containing disulfides functionalities are shown.[16b] The known approaches for the synthesis of disulfides are mainly based on using molecular oxygen,[17] transition metals,[18] phosphine-free cationic rhodium(I) complex catalyst,[19] Cu^{I}-phenanthroline catalyst,[20] base catalyzed,[21] non-transition metals,[22] oxidants,[23] sodium perborate,[24] metal organic frame works (MOFs),[25] microwave assisted,[26] electrochemical methods,[27] etc. Recently Dethe and co-workers developed synthesis of unsymmetrical disulfides using *fac*-Ir(ppy)$_3$ as photocatalyst and visible light from white LED (Figure 1 b).[28] Similarly, unsymmetrical disulfide synthesis is also reported using O_2 as the oxidant and cobalt(II)phthalocyanine-tetra-sodium sulfonate as the catalyst (Figure 1 b).[29] Herein, we report one pot synthesis of unsymmetrical organodisulfides (Figure 1 c) via umpolung approach in ethanol solvent, using molecular iodine as catalyst (20 mol%) and 4-dimethylaminopyridine (DMAP)-water as promoter of the reaction.

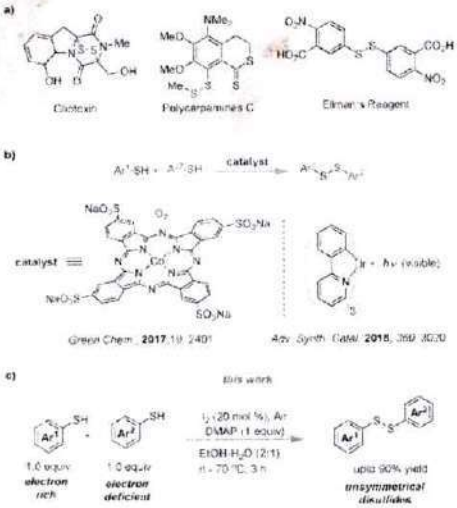

Figure 1. a) Unsymmetrical disulfides in natural products and a symmetrical disulfide in Ellman's reagent. b) Synthesis of unsymmetrical disulfides using catalysts like cobalt/phthalocyanine[29] and photoredox catalysis.[28] c) Our current approach.

Controlling of chemical reactions by non-covalent or weak interactions are gaining significant interests. To make newer or functional materials on demand appropriate interactions like halogen bonding,[30] charge-transfer,[31] hydrophobic effect,[32] cation-π,[33] anion-π,[34] etc. are generally used routinely. The concept of S–H···π hydrogen bonding interaction has been newly introduced in literature.[35] Due to the S–H···π interaction, hydrogens of thiols prefer to form a stable complex with the π-electrons of arenes (Scheme 1 a). Contrastingly, we have shown here that via umpolung reactivity of sulfur or S–H bond, direct C–S coupling could be possible through an intermediate sulfenium ion (Scheme 1 b).[36] In ethanol solvent, sulfenium ions were generated in situ using molecular iodine as catalyst and DMAP-water as a promoter of the reaction (vide infra).[37] From the mixture of electron rich and electron deficient thiols, electron rich thiols tend to make more stable sulfenium ions. Following, electrophile sulfenium ions expected to react with the second thiols and followed by oxidation led to thermodynamically stable[38] unsymmetrical disulfides (Scheme 1 c).

Towards optimization of the condition (Table 1), reactions were carried out at ambient temperature, under aerobic condi-

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PAPER

Investigation of proton conductivity in Sc and Yb co-doped barium zirconate ceramics

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Abstract

The oxygen deficient $BaZr_{0.85}Sc_{0.15-x}Yb_xO_{3-\delta}$ ($x = 0, 0.05, 0.10$) ceramics were synthesized via conventional solid state reaction route. The Rietveld analysis of the *x*-ray diffraction profile proved that all the prepared compositions presents single phase cubic perovskite symmetry and $Pm\bar{3}m$ space group. The actual oxygen occupancy of the materials has been derived from the Rietveld study. Thermo-gravimetric study of the pre-hydrated samples revealed a considerable mass loss, indicating more than 90% of the oxygen vacancies have been successfully filled by protonic defects upon hydration. FESEM images of the fractured surfaces of sintered ceramics showed dense microstructures with sub-micron sized grains and well resolved grain boundaries. The Nyquist plots differentiated the bulk, grain boundary and electrode response at lower temperatures ($\leqslant$300 °C). The bulk conductivity of the Sc and Yb co-doped barium zirconate was higher compared to that of the respective Sc-doped perovskite oxide. The activation energy of bulk conductivity and total conductivity decreased with the increase in Yb content. The total conductivity of (4.01×10^{-3} Scm^{-1}) at 600 °C has been achieved for $BaZr_{0.85}Sc_{0.10}Yb_{0.05}O_3$, suggesting the composition suitable for SOFC applications.

1. Introduction

High temperature ($\geqslant$800 °C) solid oxide fuel cell (SOFC) qualifies to be the most promising renewable energy conversion technology for stationary power generation in future [1–4]. Developing highly efficient components of an SOFC such as the electrolyte, electrodes and simultaneously reducing its operating temperature ($\leqslant$600 °C) is a major challenge. Perovskite structured materials with general formula [$A^{2+}B^{4+}O_3^{2-}$] are explored in a variety of ways for preparation of different SOFC components [5–8]. The perovskite-type oxides like barium zirconate ($BaZrO_3$) and barium cerate ($BaCeO_3$) when doped with trivalent rare earth elements shows exceptional protonic or oxide ion conduction at intermediate temperatures (<700 °C). These acceptor-doped perovskites are therefore considered as suitable candidates for application as an electrolyte in SOFC, solid electrolytes for hydrogen production, hydrogen and oxygen sensors etc [4, 9–13]. The trivalent rare earth (RE) substitution on the B-site/tetravalent-site of the perovskites results in the creation of oxygen vacancies as per equation (1)

$$2B_B^x + O_O^x + RE_2O_3 \rightarrow 2RE_B' + V_O^{\cdot\cdot} + 2BO_2 \quad (1)$$

Where Kroger-Vink notation is used to represent different symbols, $V_O^{\cdot\cdot}$ symbolizes the oxygen vacancy, $2RE_B'$ indicates the trivalent rare earth dopant at B-sites and O_O^x represents the oxide ion at oxygen sites. The oxygen vacancies (OVs) are induced in the perovskite crystal structure to maintain charge neutrality on the substitution of lower valence ions at tetravalent B^{4+} site. The creation of OV in the lattice is a pre-requisite condition for proton conduction when these materials are exposed to humid H_2O environment. The defect chemistry reactions that describes the H_2O absorption in a proton conducting electrolyte at intermediate temperatures is given as

$$H_2O(g) + V_O^{\cdot\cdot} + O_O^x \rightarrow 2OH_O^{\cdot} \quad (2)$$

Where, $OH_O^{\cdot}$ represents an oxide ion bonded to a proton (protonic defects) [14]. The hydroxide ions fill the oxygen vacancy sites as shown in equation (2), while the other proton of the water molecule forms a covalent

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A comparative proton conductivity study on Yb-doped $BaZrO_3$ perovskite at intermediate temperatures under wet N_2 environment

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ABSTRACT

Conventional solid state reaction route was used for the synthesis of oxygen deficient $BaZr_{1-x}Yb_xO_{3-\delta}$ ($x = 0.05, 0.10, 0.15, 0.20$) oxide. Rietveld refinement of x-ray diffraction data confirmed the formation of mono-phasic cubic perovskite structure with space group $Pm\bar{3}m$. The microstructure coupled with EDX analysis of the sintered ceramics reveals the formation of sub-micron sized grains, with no detection of impurity elements. Thermogravimetric analysis of the pre-hydrated sample shows a significant mass loss suggesting complete filling of oxygen vacancies by protonic defects. Impedance spectroscopy performed under wet N_2 environment show highest proton conductivity for the composition with $x = 0.20$. The total conductivity at 600 °C significantly increased from the order of 10^{-6} Scm^{-1} for $x = 0.05$ to 10^{-3} Scm^{-1} for $x = 0.20$ composition. The activation energy calculated from the Arrhenius dependence of total conductivity decreased with an increase in trivalent Yb^{3+} concentration, since the number of charge carriers in the form of protonic defects increases.

1. Introduction

Traditional oxide ionic conductors, such as yttria stabilized zirconia (YSZ), $La_{0.9}Sr_{0.1}Ga_{0.8}Mg_{0.2}O_{2.85}$ (LSGM), $La_2Mo_2O_9$ etc. ceramics have been studied extensively for high temperature (≥800 °C) solid electrolyte applications. However, several intrinsic constraints of these materials such as high conductivity values obtained at very high temperatures (≥800 °C), structural instability over a wide temperature range (phase transition) and tendency to undergo interfacial reactions demanded the development of substitutes for these materials [1–3]. Overcoming these drawbacks pose a great challenge to material scientists to develop novel materials with high proton/ionic conductivity at intermediate temperatures (300 °C–600 °C) for application in solid oxide fuel cells (SOFC), hydrogen sensors, oxygen sensors, and solid oxide steam electrolyzes etc. Doping with trivalent rare earth (RE) elements or lanthanides have proven very much beneficial in altering the electronic, optical and other physical properties of a wide variety of materials [4–6]. Rare earth (RE) element doped perovskite-type ceramic oxides based on zirconates such as $BaZrO_3$ (BZO) and cerates such as $BaCeO_3$ attract an increasing attention in recent years due to their excellent proton or oxide ion and/or mixed conductivity at intermediate temperatures [7–12]. In such perovskite-type oxides [$A^{2+}B^{4+}O_3^{2-}$], substituting trivalent rare earth cation RE^{3+} into the B^{4+} site forms oxide ion vacancy as given in equation (1)

$$2B_B^x + O_o^x + RE_2O_3 \rightarrow 2RE'_B + V_O^{\bullet\bullet} + 2BO_2 \quad (1)$$

where the equation is written by using Kröger–Vink notation. Here $2RE'_B$ represents the acceptor dopant at B-sites and O_o^x is the oxide ion at Oxygen sites, and $V_o^{\bullet\bullet}$ indicates the oxygen vacancy. The oxygen vacancies (OVs) are induced as a charge-compensating effect when lower valent ions are substituted at B^{4+}site in the perovskite structure. The introduction of oxygen vacancy in the lattice position plays an important role in oxide ion or proton conduction which appears in water vapour and oxygen containing atmosphere respectively. The defect chemistry reactions for H_2O or O_2 incorporation at intermediate temperature (300 °C–600 °C) for a proton/oxide ion conductor is given as

$$H_2O(g) + V_O^{\bullet\bullet} + O_O^x \rightarrow 2OH_O^{\bullet} \quad (2)$$

$$\frac{1}{2}O_2(g) + V_O^{\bullet\bullet} \rightarrow O_O^x + 2h^{\bullet} \quad (3)$$

where, $OH_O^{\bullet}$ is a proton bonded to an oxide ion (protonic defects)

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APPENDIX

Optical band gap and photoluminescence studies of samarium doped barium zirconate perovskite prepared by solid state reaction route

Introduction

The rare earth (RE) activated phosphors has been gaining significant technological interest in the last couple of decades for their excellent luminescence behavior. The photoluminescence properties of these materials can be tuned up for desirable display applications in various photonic devices [145, 146]. For the luminescence applications in visible and ultraviolet (UV) spectral range, materials with wide optical band gap are suitable candidates to act as host matrix for optical activation with rare earth (RE) impurities. Perovskite-type materials show a broad luminescence band which is usually associated with the presence of imperfections or defects in the crystal structure that leads to intermediate states within the band gap. $BaZrO_3$ (BZO) is one of the perovskite structured oxide that has a broad range of electrochemical, optoelectronic and refractory applications and possess wide optical band gap ranging from 3-5 eV, an eligible candidate to act as host matrix for optical activation with RE impurities [147, 148]. The multifunctional features of BZO attract attention for exploitation of different physical properties. There are several reports on the trivalent rare earth impurities doped on BZO hosts which emits within the optical window of the host material under UV excitation. In particular, most of the studies have been based on the exploitation of the 'B' site or 'Zr' site of BZO substituted with lanthanides like (Yb^{3+}, Ce^{3+}, Eu^{3+}etc) [149, 150]. Since these ions acts as acceptors when substituted at Zr^{4+}site, it results in creation of oxygen vacancies thereby affecting the ZrO_6 octahedral which alter the structural and electronic environment. Substitution at both the A and B sites can lead to changes in structural symmetry and charge distribution, and thus creates various defects via oxygen or cationic vacancies that influence the band structures. The structural order-disorder and intermediate energy levels

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RESEARCH NOTE

First report of *Aspergillus terreus* causing sunken leaf spot on *Dracaena aletriformis* in India

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Abstract
Large-leaved dragon tree (*Dracaena aletriformis* L.) is an ornamental house plant of *Asparagaceae* family and native to tropical Africa. In summer 2017, dragon tree leaves showing sunken spots symptoms were observed in several grown on the premises of the CSIR-Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow. The fungus was isolated from the lesions and its pathogenicity was confirmed. The fungus was identified based on morphological characteristics and confirmed through analysis of DNA sequences of internal transcribed spacer (ITS) regions of the ribosomal DNA. This is the first report on *Dracaena aletriformis* sunken leaf spot disease caused by *Aspergillus terreus.*

Keywords *Dracaena aletriformis* · Sunken leaf spot · Plant pathogenic fungi

Dracaena aletriformis (family- Asparagaceae), commonly called large-leaved dragon tree, is a shrubby species of Dracaena which is a tropical plant native to Madagascar, Mauritius and other nearby islands of the Indian Ocean. It is widely grown as an ornamental plant and houseplant, valued for its richly colored, evergreen, thick and irregular stems (Banerjee et al. 2017). Traditional medicine practitioners of Madagascar and African countries have long believed that different species of Dracaena to cure diseases like dysentery, diarrhea, malarial symptoms, poisoning, dysmenorrhea and to be useful as an antipyretic and hemostatic agent (Randrianarivelojosia et al. 2003). Different species of Dracaena genus have also the capacity to remove a considerable amount of indoor pollutants and significant antimicrobial activity against *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Fusarium oxysporum* (MINH et al. 2009).

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Diseases like anthracnose and leaf spot were previously reported in several species of Dracaena in different parts of the world. Leaf spot of *Dracaena hookeriana* species was reported from Chandigarh caused by *Gloeosporium polymorphism* (Sohi 1990). Serious damage by anthracnose (*Colletotrichum gloeosporioides*) on greenhouse crops of *Dracaena deremensis* was first time observed in Italy (Lenna and Montecchio 1995). Anthracnose of *Dracaena fragranci* by *Colletotrichum gloeosporioides* was recorded from China (Wang et al. 1997).

There has been no prior report of sunken leaf spot of *Dracaena aletriformis* in India. The initial symptoms of this disease appear as very small yellow to rust brown zone that gradually increases from 7 to10 mm in diameter, changing from circular to elliptical lesions on the leaves. Lesions enlarge and coalesce; causing diseased leaves to become blighted (Fig. 1a). The aim of the study was to determine the causative agent of the *D. aletriformis* sunken leaf spot disease observed in CSIR-CIMAP, Lucknow, India.

Mature *D. aletriformis* leaves showing typical symptoms of sunken leaf spot were collected from the premises of the CSIR-Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, India. Specimens were collected during May–June 2017. Five symptomatic leaves from five different plants were cut into small pieces, surface-sterilized with 1% sodium hypochlorite for 1 min, washed in sterile distilled water, placed on potato dextrose agar (PDA) plates and incubated

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Conduction and relaxation phenomena in barium zirconate ceramic in wet N_2 environment

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ABSTRACT

Proton conducting barium zirconate perovskite was prepared by conventional mixed oxide reaction route. The x-ray diffraction patterns proved the single phase cubic perovskite structure of the synthesized ceramic. SEM analysis of the ceramic pellets sintered at 1600 °C reveals the formation of dense microstructure with average grain size of 5–6 μm. Complex impedance spectroscopy study was performed over a wide range of frequency (10 Hz-5MHz) under wet N_2 ($pH_2O = 0.031$ atm) and dry N_2 environment respectively varying the temperature from 300 °C to 600 °C. Two types of relaxation phenomena were evident from the impedance spectroscopic analysis, indicating the effect of grain and grain boundary to the overall resistance of the compositions. The conductivity due to grain and grain boundary contributions measured for the sample under wet N_2 environment was found fairly one order higher in magnitude than that measured in dry N_2 atmosphere respectively. The activation energy for conduction under wet N_2 condition is found lower than that measured in dry conditions. The comparison of conductivity under two different environments reveals that additional charge species take part in conduction process under wet condition. These are attributed to the protonic defects which are incorporated into barium zirconate through extrinsic oxygen vacancies generated due to sintering at higher temperature.

1. Introduction

The development of barium zirconate ($BaZrO_3$) ceramic has gained considerable interest for its versatile applications such as dielectrics for electronic systems, substrates for growth of high T_c superconductors, phosphors for different coloured light emission, field emission displays and green catalysts etc. [1–4]. $BaZrO_3$ (BZO) is a very promising material for its highly symmetric cubic perovskite structure which shows excellent structural stability (no phase transition) over a wide range of temperatures. The high melting point (>2600 °C), low thermal expansion coefficient (0.87×10^{-5} °C^{-1}) and negligible chemical reactivity to different reducing conditions like CO_2 and H_2O are some of the interesting physical properties of BZO which are exploited for several high temperature applications [5–8]. Due to this thermal and chemical stability, BZO has potential application in refractory industry [9]. This multifunctional material also qualify to develop as an alternative electrolyte material in solid oxide fuel cells (SOFCs), replacing traditional oxide ion conductors like yttria stabilized zirconia (YSZ) and $La_{0.9}Sr_{0.1}Ga_{0.8}Mg_{0.2}O_{2.85}$ (LSGM) etc. which operates at high temperatures ≥800 °C [10,11]. Perovskite $BaZrO_3$ (BZO) is considered as an efficient proton conductor at intermediate temperatures ≤600 °C when doped with rare earth elements and exposed to H_2 or H_2O environment [12–15]. The thermal and chemical stability of the BZO under different reducing environments attracts attention and various researchers have reported varied total conductivity (of the order of 10^{-6}-10^{-2} Scm^{-1}) for nominally identical compositions [16–18]. These troubling discrepancies in the reported conductivity of doped-BZO over these years are attributed to various factors that govern the ionic conductivity [19]. The poor sinterability of BZO ceramic results in low density, which is a limiting factor to be used as an SOFC electrolyte. The reduced density or a high percentage of porosity results in decreased ionic conductivity of the BZO ceramic. High bulk density is one of the essential requirements of a material to serve as an SOFC electrolyte which ensures the ionic transfer takes place at a faster rate throughout the bulk of the material. There are reports where the relative density of only 70% could be achieved for pure BZO after intermediate heating of compact pellets at 1200 °C for 72 h and final sintering of 1350 °C for 48 h [20]. Hence researchers have tried different methods of synthesis for obtaining highly dense BZO ceramics. A wide range of wet chemical process using

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Two semicircles were resolved distinctively at low temperatures < 300 °C, one at higher frequencies ascribed to the grain resistance of the proton conducting ceramics, followed by the lower frequencies part attributed to grain boundary resistance. For any fixed doping concentration, the conductivity enhanced almost two orders of magnitude when the temperature was increased from 300 °C to 600 °C. The total conductivity of 20% Dy-substituted BZO has been found to be the highest attaining the value of 4.15×10^{-3} S.cm^{-1} at 600 °C. The high proton conductivity makes this material one of the promising candidate as an electrolyte for SOFC applications at intermediate temperatures.

Similarly the electrical conductivity of Sm-substituted barium zirconate compositions has been calculated under wet N_2 atmospheres (Chapter 6). The conductivity improved gradually with the increase in doping proportions. However for any fixed doping concentration, the conductivity of Sm-BZO was found one order lower as compared to Sm-BZO.

The bulk conductivity of the Sc and Yb co-doped barium zirconate was found higher as compared to that of the singly Sc-doped BZO (Chapter 7). The grain boundary conductivity drastically increased when mixed doping was considered. Conductivity of the range of 10^{-3} S.cm^{-1} has been achieved even if the optimum concentration of rare earth dopant is reduced. High total conductivity of 4×10^{-3} S.cm^{-1} was achieved for mixed doped (Yb and Sc) $BaZr_{0.85}Sc_{0.10}Yb_{0.05}O_{3-\delta}$, which is suitable SOFC applications.

8.2. Future scope of work

The performances of the materials investigated in this thesis with conductivity of the order of 10^{-3} S.cm^{-1} can be studied in a prototype fuel cells. It would be of main interest. Therefore, adequate electrodes have to be developed.

Densification of rare earth doped barium zirconate at low temperature could be improved. Using spark plasma sintering or microwave sintering technique can be beneficial and is an interesting approach.

The use of Scandium as a co-dopant with Dy or Sm can increase the performance with simultaneously reducing the optimal doping concentration.

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Trends of Recent Research on Effective Leadership in Relation to School Education

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Abstract: *Developing leaders and leadership are key factors to improve learning and teaching in school education. The research review highlights the importance of being informed about the trends of research related to effective leadership at school education, particularly of the principals and teachers, as they play a key role in setting direction and creating a positive school culture including the proactive school mind set, and enhancing staff motivation and commitment needed to foster improvement and promote success for schools in challenging circumstances. It is found that, despite the abundance of literature concerning developing formal leadership, fewer studies have been conducted with academicians in leadership roles that focus on how they develop their leadership in learning and teaching. In the school system, teacher leadership is generally accepted as having a critical role in supporting school improvement. However, most knowledge on teacher leadership comes from the West, and the roles of teacher leadership in the East remain largely unexplored. The paper attempts to compare the trends of research on school leadership in India with the present trends at the international level. The findings from this review will contribute for the future researches and as references on how effective leadership sustains school improvement.*

Keywords: *School leadership, leadership style, leadership assessment, leadership development*

1. INTRODUCTION

Leadership is an important factor in the effective implementation of educational objectives in schools. Research on school leadership suggests that both principal and teacher leadership are important for school improvement. It is neither teachers nor principals alone who improve schools, but teachers and principals working together (Schmidt-Davis & Bottoms, 2011) [1]. Successful leadership is not the result of simply obtaining a position, but rather possessing the knowledge and understanding of successful leadership skills along with the personal ability to effectively implement those skills. Hence, "School leaders need impressive skills to provide effective leadership in our diverse school environments". Such skills are not technical but humanistic, (Sharma 2010)[2]. Decades of research on different leadership styles shows that effective school leadership is the degree of influence or synergy between teachers and principals around the core business of schools, instruction (Urick, 2016)[4]. A noteworthy finding by Wallace Foundation (2011) [3] is the empirical link between school leadership and improved student achievement. School leaders, particularly principals, have a key role to play in setting direction and creating a positive school culture including the proactive school mind-set, and supporting and enhancing staff motivation and commitment needed to foster improvement and promote success for schools in challenging circumstances. Education research shows that school variables if considered separately, have at most small effects on learning. The real payoff comes when individual variables combine to reach critical mass. Creating the conditions under which that can occur is the job of the principal (Wallace Foundation, 2011)[3]. Moreover, the performance of teachers is an important factor that must be considered in efforts to improve the quality of education. Teacher's performance is affected by many factors (Wenno, 2017)[5]. However, few studies have dealt on the interaction of principal and teacher leadership as separate but linked systems in how they relate to student outcomes. The realization of these initiatives directly depends on the effective school leadership. This places greater emphasis on creating mechanisms for continuous training or support for School Leaders. The potential transition in the dynamics of relationships between the governments, the school administrators, the teachers, the students, the parents and the broader community, would need leaders with skills and knowledge to critically analyse the challenges that arise due to changing times. In line with the needs of education reforms in India, our school leaders are expected to set the tone for growth of their institutions to create institutions of excellence (rather than copying the best practices of other organisations) and make this growth apparent to all the stakeholders.

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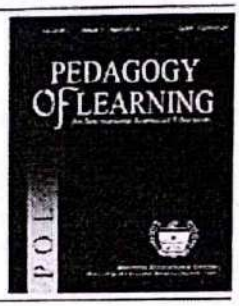

Emotional Intelligence and Self Efficacy of Govt. and Private Secondary School Teachers of Khordha District in Relation to their Job Status and Teaching Experience

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Abstract

The present research study conducted in secondary schools of Khordha district of Odisha to find out the self efficacy and emotional intelligence of secondary school teachers in relation to their job status and teaching experiences. The sample consists of 45 private and 45 government teachers from 15 secondary schools of Khordha district. Emotional intelligence Scale (EIS) and Teachers Self-efficacy Scale (TSES) were used as tools. The collected data were analyzed by calculating mean, SD and t-test. The t-test analysis showed that there is no significant difference in the self efficacy and emotional intelligence of secondary school teachers of Khordha district in relation to their job status and teaching experiences. However high teaching experience teachers are slightly higher on the self efficacy as compared to average and less experience teachers.

Keywords: Teacher Self-efficacy, Emotional Intelligence, Job Status, Teaching Experiences.

Leaf photosynthesis and antioxidant response in selected traditional rice landraces of Jeypore tract of Odisha, India to submergence

Jijnasa Barik, Debabrata Panda, Sangram K. Mohanty & Sangram K. Lenka

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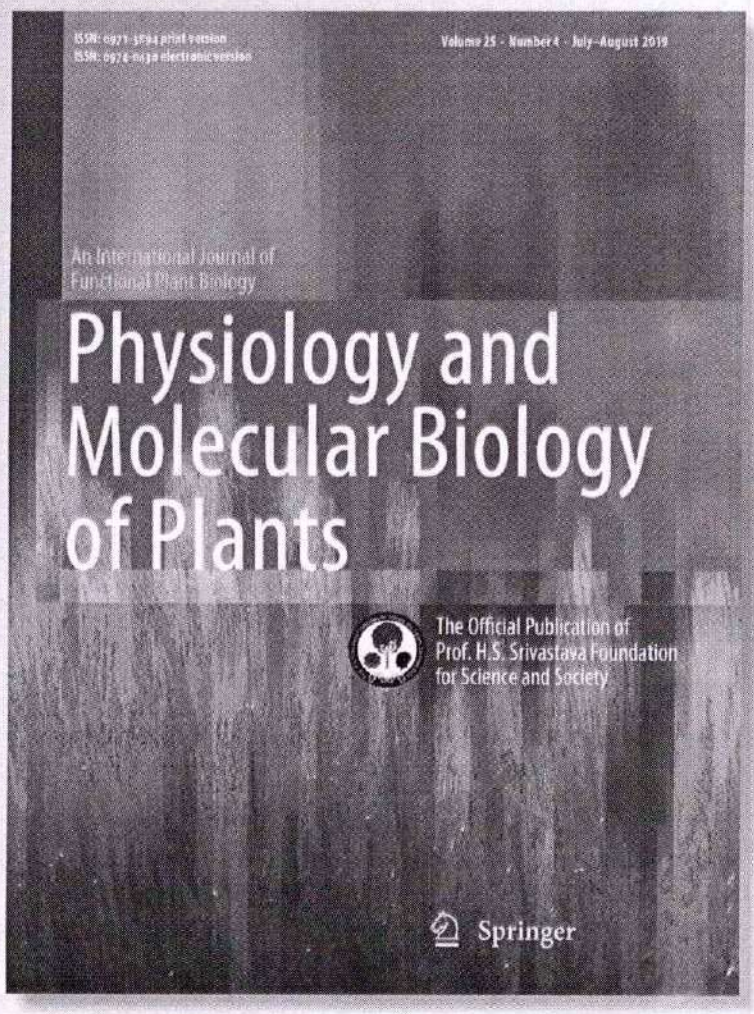

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RESEARCH ARTICLE

Leaf photosynthesis and antioxidant response in selected traditional rice landraces of Jeypore tract of Odisha, India to submergence

Jijnasa Barik[1] · Debabrata Panda[1] · Sangram K. Mohanty[2] · Sangram K. Lenka[3]

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Abstract Submergence tolerance in rice is important for improving yield under rain-fed lowland rice ecosystem. In this study, five traditional rice landraces having submergence tolerance phenotype were selected. These five rice landraces were chosen based on the submergence-tolerance screening of 88 rice landraces from various lowland areas of Jeypore tract of Odisha in our previous study. These five rice landraces were further used for detailed physiological assessment under control, submergence and subsequent re-aeration to judge their performance under different duration of submergence. Seedling survival was significantly decreased with the increase of plant height and significant varietal difference was observed after 14 days of complete submergence. Results showed that submergence progressively declined the leaf photosynthetic rate, stomatal conductance, instantaneous water use efficiency, carboxylation efficiency, photosystem II (PSII) activity and chlorophyll, with greater effect observed in susceptible check variety (IR 42). Notably, higher activities of antioxidative enzymes and ascorbate level were observed in traditional rice landraces and were found comparable with the tolerant check variety (FR 13A). Taken together, three landraces such as *Samudrabali*, *Basnamundi* and *Gadaba* showed better photosynthetic activity than that of tolerant check variety (FR 13A) and showed superior antioxidant response to submergence and subsequent re-aeration. These landraces can be considered as potential donors for the future submergence tolerance breeding program.

Keywords Antioxidant · Gas exchange · Traditional rice · Photosynthesis · PSII activity · Submergence

Introduction

Complete submergence due to flash flooding is one of the foremost constraints for rice production, mainly in rainfed lowland areas of South and South-East Asia (Dar et al. 2017; Afrin et al. 2018). Out of ~ 20 million ha of rainfed lowland rice growing areas, 12–14 million ha in India are prone to flash flooding with average productivity of only 0.5–0.8 t ha^{-1}, which is far lower than that of national average productivity (Ismail et al. 2013; Bhowmick et al. 2014). The yield gap is substantially high because of the high yielding rice varieties grown in these areas are susceptible to submergence and perish within 7–14 days (d) of waterlogging (Sarkar et al. 2006; Ismail et al. 2013; Singh et al. 2017). Therefore breeding for submergence tolerance trait will be crucial for maintaining stable yields in these rainfed lowland rice ecosystems (Dar et al. 2017; Goswami et al. 2017). In the last decade, molecular mechanisms underlying flash flood tolerance have been revealed by the identification of major QTL, *Sub1* from FR 13A, a submergence tolerant rice cultivar of Odisha, India (Xu et al. 2006). This QTL has been successfully introgressed into several high yielding varieties and flash flood-tolerant

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Data Article

Data on genetic potentiality of folk rice (*Oryza sativa* L.) genotypes from Koraput, India in reference to drought tolerance traits

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ABSTRACT

Precise physiological and molecular marker-based assessment provides information about the extent of genetic diversity, which helps for effective breeding programmes. We have conducted detailed physiological and molecular marker-based assessment of selected eight indigenous rice landraces from Koraput, India along with tolerant (N22) and susceptible (IR64) check varieties under control and simulated drought stress using polyethylene glycol (PEG) 6000. After exposure to different levels of drought stress, relative germination performance (RGP), seedling vigour index (SVI) and relative growth index (RGI) were significantly declined in all the rice landraces compared to the control plants and significant varietal differences were observed. Genetic relationship among the studied rice landraces was assessed with 24 previously reported drought tolerance linked Simple Sequence Repeat (SSR) markers. A total of 53 alleles were detected at the loci of the 24 markers across the 10 rice accessions. The Nei's gene diversity (*He*) and the polymorphism information content (*PIC*) ranged from 0 to 0.665 and 0 to 0.687, respectively. Six SSR loci, RM276, RM411, RM3, RM263, RM216 and RM28199, provided the highest *PIC* values and are potential for exploring the genetic diversity of studied rice lines for drought tolerance. Four rice genotypes

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उपभोक्तावाद के वशीभूत नारी ❑ डॉ. इन्दु बाला अग्रवाल

स्वतंत्रता और अपनी पहचान बनाने की धुन में उपभोक्तावादी संस्कृति की गुलाम बनती नारी क्या इसका रिवर्स नहीं कर सकती, क्या वह अपनी आन-बान-शान बरकरार रख, घर परिवार को गौरवान्वित करने तथा सबको साथ लेकर बाजारीकरण, वैश्वीकरण को अपने हुनर, अपनी कला को मुनाफे में तब्दील नहीं कर सकती। क्या शिक्षा का इस्तेमाल समाज को शिक्षित व सुनियोजित करने में नहीं किया जा सकता। अपनी सेवाओं द्वारा चाहे डॉक्टर या नर्स बनकर समाज को बहुउपयोगी सेवा उपलब्ध नहीं करवा सकती।

9

अनुक्रम

Bharatiya Sanskriti Education and Women

❑ **Dr. T. S. Girishkumar**

Bharat always had its own knowledge tradition, and this originated much before all other knowledge traditions of the world. But the conquests and other influences from outside influenced Bharatiya knowledge tradition in a devastating manner. Those who came from out side had never understood Bharatiya knowledge tradition because of the huge conceptual and logical differences in what they knew and the Vedopanishadic knowledge tradition. They imposed what they thought as correct, especially in the light, that they never understood Bharat.

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Woman is the magnificent creation of god, a multi faceted personality with the power of benevolence, adjustability, integrity and tolerance. Women are the pioneers of nation. There is nothing that a woman cannot do or excel at. The potential and abilities of women are humongous. Gone are the days when women were considered only the household entities commanded by males. Today, more than ever, women are becoming active participants and full protagonists of the development process. Women s participation in the development process has been recognized not only as an issue of human rights and social justice, but also as a crucial contribution to solving the pressing needs of most important and often-excluded segments of society.

Role of Women in Social Development

❑ **Prof. P.C.Agarwal**

The most famous saying of our ancestors is "To awaken the people, it is the women who must be awakened. Once she is on the move, the family moves, the village moves, the nation moves".

This quote is well accepted by all and supported by yet another famous saying of Brigham Young which is "If you educate a man; you educate a man. You educate a woman; you educate a generation."

Woman is the magnificent creation of god, a multi faceted personality with the power of benevolence, adjustability, integrity and tolerance. Women are the pioneers of nation. There is nothing that a woman cannot do or excel at. The potential and abilities of women are humongous. Gone are the days when women were considered only the household entities commanded by males. Today, more than ever, women are becoming active participants and full protagonists of the development process. Women's participation in the development process has been recognized not only as an issue of human rights and social justice, but also as a crucial contribution to solving the pressing needs of most important and often-excluded segments of society. Furthermore, evidence shows that women's participation in social development initiatives, in policymaking and in developmental decisions which generates benefits that are beneficial not only to women and their communities, but also society as a whole. The real life example of women's role in the development of society is innumerous. Give women the right shoes and they can conquer the world. Now with the encouragement of co-education, women have cast off the age old inferiority complex and are marching side by side with men in every walk of life. Women are actually proving to be academically better and socially more active. When we come across the results of competitive examinations in all India civil services and Indian universities we are happily surprised to note that women

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ऑनलाइन लर्निंग : ज्ञान के नए आयाम ❑ डॉ. दीपक कुमार शर्मा

आज शिक्षा क्षेत्र से संबंधित हर वर्ग यथा विद्यार्थी, शिक्षक, शोधार्थी, वैज्ञानिक, अर्थशास्त्री, साहित्यकार, इतिहासकार, कलाकार आदि हेतु नि:शुल्क सरकारी वेबसाइट एवं मोबाइल एप्लीकेशंस (Apps) उपलब्ध हैं, जिनका संबंधित वर्ग अपनी सुविधानुसार उपयोग कर सकता है। आज हम समय-समय पर अपना दक्षता परीक्षण विविध ऑनलाइन परीक्षाओं/टेस्ट के माध्यम से कर सकते हैं। विभिन्न प्रतियोगी परीक्षाओं की तैयारी कर रहे विद्यार्थी इनका काफी उपयोग कर रहे हैं। इंटरनेट पर बड़ी मात्रा में निजी क्षेत्र की संस्थाएँ ऑनलाइन अध्ययन सामग्री उपलब्ध करवा रही हैं लेकिन इस हेतु विद्यार्थियों को काफी धनराशि व्यय करनी होती है। यहाँ कुछ चुनी हुई सरकारी ऑनलाइन अध्ययन सामग्री युक्त पोर्टल /मोबाइल एप्लीकेशन (Apps) की जानकारी दी जा रही है जो सभी के लिए नि:शुल्क उपलब्ध हैं।

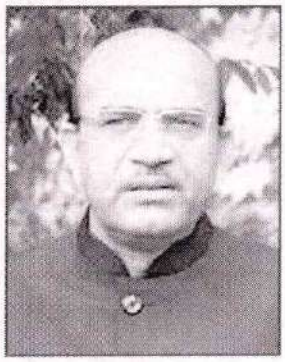
अनुक्रम

E-education and Challenges

❑ Dr. T. S. Girishkumar

To sum up, with all the advantages of E-information, let us see that we get information only through E-learning. Depending upon the learner, this information could be confusing, haphazard or even misleading. To put such information into proper places, there must always be a teacher. Electronic media and the internet have a definite advantage of instant information, which is a great thing indeed. But there is a difficulty of inability to cross check the authenticity of the given information. None else but a teacher alone can-do reparations to such situations.

"I dream to a digital India..."
Narendra Modi



Just like every coin has two sides, e-learning is also bi-folded. It has its advantages as well as some drawbacks. E-learning is just the tool in the hands of the teacher and not vice versa. Technology can never replace the teacher. Teachers can use technology in order to make their teaching learning process more effective and engaging. E-learning as a method of education makes the learners undergo contemplation, remoteness, as well as lack of interaction. With respect to clarifications and interaction with teachers, the e-learning method might be less effective than the traditional method of learning. The learning process is much easier with the use of the face to face encounter with the instructors or teachers. .

❑ **Prof. P.C. Agrawal**

The development of multi media and information technologies, as well as the use internet as a new technique of teaching, has made radical changes in the traditional process of teaching. Development in information technology has generated more choices for today's education. Agendas of schools and educational institutions have recognized e-Learning as having the prospect to transform people, knowledge, skills and performance. Colleges, universities, and other institutions of higher learning race to advance online course capability in a speedily developing education in the society. E-learning, has come to be more and more important in institutions of higher education.

Many initiatives have been taken by NCERT to bridge the gap between the education and the students. The digital India campaign has promoted extensive use of ICTs in the teaching learning process. The ePathshala, a joint initiative of Ministry of Human Resource Development (MHRD), Govt. of India and National Council of Educational Research and Training (NCERT) has been developed for showcasing and disseminating all educational e-resources including textbooks, audio, video, periodicals, and a variety of other digital resources. The ePathshala Mobile app is designed to achieve equitable, quality, inclusive education and lifelong learning for all and bridging the digital divide existing in the society. Another initiative in the field of e-learning is SWAYAM, a massive open online courses (MOOCS) initiative.

Educational courses under SWAYAM are offered online and can be accessed by students through digital classrooms. SWAYAM PRABHA is a direct- to-home service. This means that classroom lectures and the classroom

शैक्षिक मंथन

(द्विभाषी मासिक)

शैक्षिक क्षेत्र की प्रतिनिधि पत्रिका

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पृष्ठ संयोजन : सागर कम्प्यूटर, जयपुर

राष्ट्रीय आंदोलन में स्वातंत्र्यवीर सावरकर का शैक्षिक आयाम

✍ हनुमान सिंह राठौड़

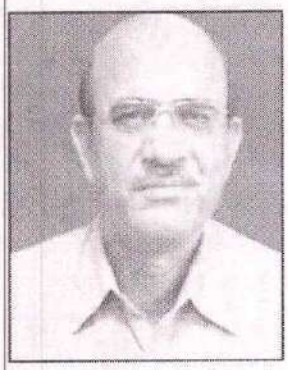
अपने अध्ययन व पठित पुस्तक के सारांश व उद्धरणों को वीर सावरकर ने पृथक् पुस्तिका में, जिसे वे 'सर्वसार संग्रह' कहते थे, लिखने का स्वभाव बनाया। इसके संबंध में उनका कथन है, ''इस कारण मेरा वाचन धूल पर बनी लकीरें नहीं रहता था और पूरी तरह पच जाता था। फिर आवश्यकता पड़ने पर उस टिप्पणी को देखते ही सारा विषय आँखों के सामने आ जाता और फिर जब चाहता, उस विषय पर निबंध या व्याख्यान देना सम्भव हो जाता। वह हमारी 'मित्र मेला' की साप्ताहिक बैठकों के लिए भी उपयोगी रहा। पढ़कर जो समझा, जब उसे दूसरों को कहने जाते, तो कई गुना अधिक समझ में आ जाता।

5

अनुक्रम

भारतीय स्वतंत्रता आंदोलन और शिक्षा

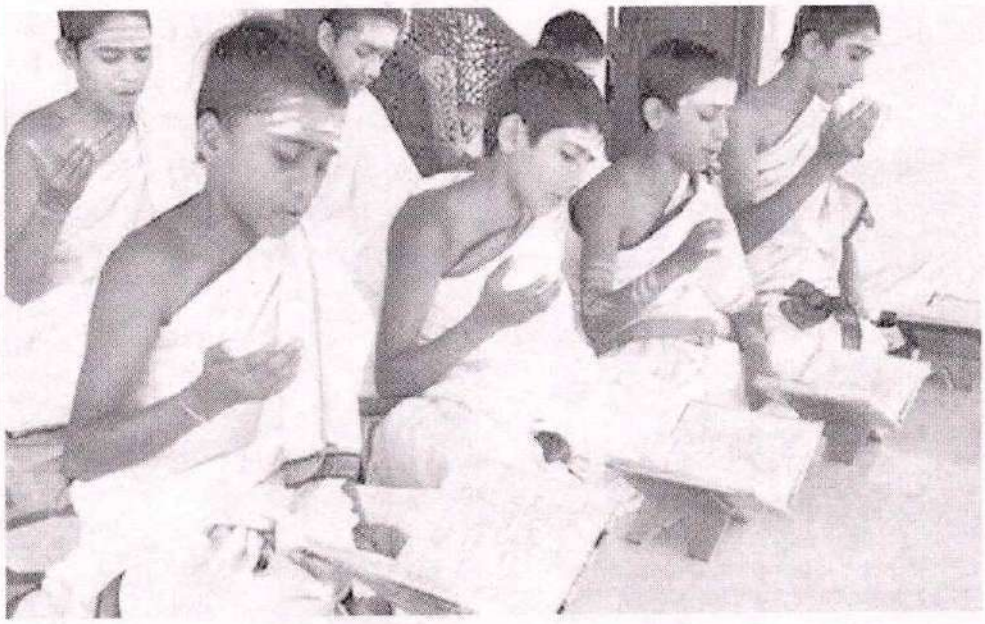
❑ प्रो. प्रकाश चन्द्र अग्रवाल



अंग्रेजों के द्वारा भारतीय शिक्षा प्रणाली की उपेक्षा के पूर्व तक भारतीयों का शैक्षिक स्तर तथा उनका सामाजिक आर्थिक व्यवस्था में योगदान सराहनीय रहा। हालाँकि अनेक रियासतों के कारण वहाँ के छोट-बड़े महाराजाओं द्वारा स्थानीय शिक्षा प्रणाली के फलस्वरूप शिक्षा में सार्वभौमीकरण व एकरूपता का नितान्त अभाव था। सभी रियासतें एक दूसरे की सीमाओं के अतिक्रमण व विस्तारवादी मानसिकता से लिप्त थी। मध्यकालीन भारत में अनेकों कुरीतियों व आडम्बरों के चलते आए पतन के कारण कई चिन्तकों व समाज सुधारकों ने भारतीय चेतना का पुनर्जागरण कर इसकी शिक्षा व्यवस्था व समाज व्यवस्था को अपना मार्गदर्शन दिया।

भारत की शिक्षा प्रणाली का इतिहास बहुत गौरवमयी रहा है। सुनियोजित आश्रम व्यवस्था और ब्रह्मचर्याश्रम में सार्वभौमिक मूल्य आधारित सार्वजनीन शिक्षा व्यवस्था का प्रचलन था। परन्तु कलान्तर में कुछ विसंगतियों के चलते एवं आड़म्बर व कर्मकाण्ड के प्रभाव में इसमें परिवर्तन परिलक्षित हुए। विभिन्न आततायियों के आक्रमणों व राजनैतिक/शासकीय अस्थिरताओं के चलते इसमें परिवर्तन होते गए। अंग्रेजों द्वारा देश पर आधिपत्य के पहले तक देश में छोटी बड़ी सभी रियासतों में रोजगार मूलक शिक्षा का पीढ़ी दर पीढ़ी अनुगमन होता रहा एवं समस्त निवासी खुशहाल जीवन व्यतीत करते रहे। वैदिक, ब्राह्मणिक, बौद्ध-कालीन, जैन-कालीन, दास-कालीन एवं मुगलकालीन शिक्षा में समसामयिक परिवर्तन तथा परलौकिक शिक्षा से लौकिक व धार्मिक शिक्षा तक का सफर भारतीय परिवेश में सम्मिश्रित होकर भारतीय भाषाओं व शिक्षा शैली को बदलता रहा। कभी वैदिक शिक्षा में गुरुकुल पद्धति से लेकर, बौद्ध मठों में शिक्षा संचालन तो कभी सबके लिए शिक्षा से लेकर केवल पुरुष समाज तक केन्द्रित शिक्षा, कभी आध्यात्मिक व परलौकिक शिक्षा से लेकर लौकिक शिक्षा तो कभी मज़हब के विस्तार के लिए धार्मिक शिक्षा। कभी रोजगार मूलक व स्वकेन्द्रित शिक्षा तो कभी कला, सौन्दर्य, साहित्य से ओतप्रोत सर्वांगीण व सामाजिक सरोकारों से निहित शिक्षा के केन्द्रित होने के बावजूद भारतीयों में शिक्षा अर्जन, सामाजिक समरसता व समाज-उत्थान वाली तथा कौशल आधारित शिक्षा के चलते देश खुशहाल रहा।

अंग्रेजों के द्वारा भारतीय शिक्षा प्रणाली की उपेक्षा के पूर्व तक भारतीयों का शैक्षिक स्तर तथा उनका सामाजिक आर्थिक व्यवस्था में योगदान सराहनीय रहा। हालाँकि अनेक रियासतों के कारण वहाँ के छोट-बड़े महाराजाओं द्वारा स्थानीय शिक्षा प्रणाली के फलस्वरूप शिक्षा में सार्वभौमीकरण व एकरूपता का नितान्त अभाव था। सभी रियासतें एक दूसरे की सीमाओं के अतिक्रमण व विस्तारवादी मानसिकता से लिप्त थी। मध्यकालीन भारत में अनेकों कुरीतियों व आडम्बरों के चलते आए पतन के कारण कई चिन्तकों व समाज सुधारकों ने भारतीय चेतना का पुनर्जागरण कर इसकी शिक्षा व्यवस्था व समाज व्यवस्था को अपना मार्गदर्शन दिया।



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Efficacy of conventional and herbicidal approach on weed flora in *Rabi* groundnut (*Arachis hypogaea* L.)

Ananyaa Mohanty, SN Jena and SK Swain

Abstract
A field experiment was conducted during *rabi* 2017-18 at Central Research Station, OUAT Bhubaneswar to assess the efficacy of conventional and herbicidal approach on weed flora in groundnut. The experiment was laid in a randomized block design with fourteen treatments replicated thrice. Uncontrolled weed growth throughout the crop season resulted in yield loss of about 54.4% in *rabi* groundnut. *Digitaria ciliaris, Digitaria sanguinalis Eleusine indica, Dactyloctenium aegyptium, Panicum maximum* among grasses, *Borreria hispida, Cleome rutidosperma, Croton sparsiflorus, Tephrosia purpurea, Phyllanthus niruri, Celosia argentea* among broadleaved weeds and *Cyperus rotundus*, the only sedge were the predominant weeds found in the experimental plot. Amongst the herbicidal treatments, pre-emergence application of oxyfluorfen @ 0.05kg/ha (PE) +1 Handweeding at 20 DAS significantly reduced the weed density (27.90 number/m^2), weed dry weight (50.50 g/m^2) and showed the highest weed control efficiency.(84.6%).

Keywords: oxyfluorfen, weed density, weed control efficiency, weed dry weight

Introduction
Groundnut (*Arachis hypogaea* L), the unpredictable legume' is the 13th most important food crop and 4th most important oilseed crop of the world and accounting for 17.4% of the area and about 26.7% of the total national production of all the oilseeds. It occupies an area of 4.56 mha with a production of 6.77 mt and productivity of 1486 kg/ha. (Directorate of Economics & Statistics, DAC & FW, 2015-2016). Heavy weed infestation is one of the important factors contributing to the low productivity of groundnut. Weed control is more critical in groundnut than in other crops because of its slow growth which makes it a poor competitor of weeds. Hence, weeds should be controlled during the first 4-8 weeks after planting. In groundnut, the loss in pod yield ranges from 13 to 100% depending on the season, cultivars, weed composition and duration of crop weed competition, and the packages of practices adopted (Ghosh, 2000) [2]. Besides competing for resources weeds hinder pegging, compete for underground space, and make harvesting of groundnut cumbersome. The presence of weeds for long time in the field affects the pod size, thus deteriorating the quality of the produce and fetching a lower price in market. Conventional methods like manual weeding is mostly practiced to control weeds in groundnut. But unavailability and scarcity of labourers, hike in the labour wages and unfavourable environmental conditions during the critical period of crop-weed competition reduces the effectiveness and reliability of hand weeding. Therefore, herbicides alone or in combination with manual weeding provide an economically viable alternative for weed control. Thus the present study was undertaken to assess the efficacy of conventional and herbicidal approach on growth and yield attributes in *rabi* groundnut.

Materials and Methods
The field study was conducted at Central Research Station, OUAT Bhubaneswar. The latitude and longitude of the research station is 21° 15' N and 85° 52' E, respectively, with an altitude of 25.9 m above the mean sea level and the station is situated at about 64km away from the Bay of Bengal. The station belongs to the East and South Eastern Coastal Plain Agro-climatic Zone of Odisha. The experiment was laid out in a Randomized Block Design (RBD) with 14 different weed management treatments replicated thrice comprising comprising T1- pre-emergence (PE) application of pendimethalin @1kg/ha, T2-oxyfluorfen @0.05kg/ha (PE), T3-

post emergence application (PoE) of imazethapyr @0.12 kg/ha at 20 DAS, T4- quizalofop- ethyl @0.05 kg/ha (PoE) at 20DAS, T5-pendimethalin @1kg/ha (PE) +1 HW at 20 DAS, T6-oxyfluorfen @ 0.05kg/ha (PE) + 1HW, T7- pendimethalin @1kg/ha (PE) fb quizalfop-ethyl @0.05kg/ha (PoE) at 20DAS,T8-pendimethalin @1kg/ha (PE) fb imazethapyr @0.12kg/ha (PoE) at 20DAS,T9-oxyfluorfen@0.05kg/ha (PE) followed by quizalfop-ethyl @0.05kg/ha(PoE) at 20 DAS,T10-oxyfluorfen @0.05kg/ha fb imazethapyr @0.12kg/ha (PoE) at 20 DAS, T11- farmers Practice at 20 DAS, T12- Two hand weedings at 20 fb 40 DAS, T13-weed free and T14-weedy check. ICGV91114" (Devi) was the test variety of the experiment. The soil was acidic (pH-4.90) and sandy loam in texture with low organic carbon (0.37%) and available N of 192.4 kg/ha, P_2O_5 of 33.4 kg/ha and K_2O of 197.4kg/ha. Kernels were treated with Bavistin @1.5g/kg kernel one day before sowing. Lines were drawn 30 cm apart by trench hoe and seeds were sown in furrows at equal depth maintaining a spacing of 10cm. Proper dose of herbicide was mixed well with required quantity of water and allowed to stand for 5-10 minutes and was sprayed by knapsack sprayer using a flat nozzle according to time of application. Intercultural operations were done according to the treatments. Recommended dose of fertiliser dose of 20-40-20 N, P, K was applied and all other operations were done according to the crop requirements. Monocot, dicot weeds and sedges present within a 0.5 m x 0.5 m quadrant in each net plot area were counted separately, number of weeds per m^2 was computed. The field data was subjected to statistical analysis through standard analysis of variance techniques as described in Statistical procedure for Agricultural Research" by Gomez and Gomez (1984) [3]. Standard error of means (SEm ±) and critical differences were calculated at 5% level of significance for significant treatment effect.

Results and Discussion

Weed Flora

All total, 15 different species of weeds occurred during the crop growing season. Broad leaved weeds dominated the weed population comprising of 53.5% of the total at harvest followed by grassy weeds which accounted for 40.7% and sedges accounted for 5.8% of the total at harvest (Table1). Broadleaved weeds out numbered grasses and sedges at different stages of crop growth. Amongst the grasses *Digitaria ciliaris* was the most predominant weed comprising 16.8% at 30 DAS, 16.4% at 60 DAS, 15.2% of the total population at 90 DAS and harvest. Similarly, in broad leaved weeds *Borreria hispida* was the most prominent one accounting for 30.5% at 30 and 60 DAS, 32.5% at 90 DAS and 31.7% at harvest. *Cyperus rotundus* was the only sedge found in the experimental plot, comprising of 8.8% at 30 DAS, 9.0% at 60 DAS, 6.1% at 90 DAS and 5.8%.

Table 1: Floristic composition of major weeds per m^2 area at different days after sowing

Sl. No	Scientific Name	Family	30 DAS		60 DAS		90 DAS		At harvest	
			Population	% of grand total	Population	% of grand total	Population	% of grand total	Population	% of grand total
A.	**Grassy weed**									
1	*Digitaria ciliaris*	Poaceae	38.3	16.8	51.0	16.4	44.5	15.2	39.2	15.2
2	*Digitaria sanguinalis*	Poaceae	24.8	10.9	33.5	10.8	31.0	10.6	26.8	10.5
3	*Eleusine indica*	Poaceae	24.3	10.7	32.3	10.4	30.1	10.3	26.6	10.3
4	*Dactyloctenium aegyptium*	Poaceae	7.3	3.2	11.8	3.8	10.2	3.5	9.0	3.5
5	*Panicum maximum*	Poaceae	3.0	1.3	4.0	1.3	3.5	1.2	3.1	1.2
	Total		97.7	42.9	132.7	42.7	119.3	40.8	105.0	40.7
B.	**Sedges**									
1	*Cyperus rotundus*	Cyperaceae	20.0	8.8	28.0	9.0	18.0	6.1	15.0	5.8
	Total		20.0	8.8	28.0	9.0	18.0	6.1	15.0	5.8
C.	**Broad leaved weeds**									
1	*Borreria hispida*	Rubiaceae	69.4	30.5	94.7	30.5	95.1	32.5	81.8	31.7
2	*Cleome rutidosperma*	Capparidaceae	14.6	6.4	19.9	6.4	20.5	7.0	18.1	7.0
3	*Cleome viscosa*	Capparidaceae	11.4	5.0	16.5	5.0	18.7	6.4	16.5	6.4
4	*Croton sparsiflorus*	Euphorbiaceae	5.5	2.4	7.4	2.4	7.0	2.5	6.4	2.5
5	*Eclipta alba*	Asteraceae	3.4	1.5	4.7	1.5	5.0	1.7	4.1	1.6
6	*Celosia argentea*	Amaranthaceae	2.7	1.2	3.7	1.2	4.4	1.5	3.9	1.5
7	*Phyllanthus niruri*	Euphorbiaceae	1.4	0.6	1.8	0.6	2.0	0.7	5.2	2.0
8	*Tephrosia purpurea*	Fabaceae	1.1	0.5	1.6	0.5	1.5	0.5	1.3	0.5
9	*Physalis minima*	Solanaceae	0.7	0.3	1.0	0.3	0.8	0.3	0.5	0.2
	Total		110.0	48.3	150.3	48.3	155.3	53.1	138.0	53.5
	Grand total		227.7	100.0	310.7	100.0	292.6	100.0	258.0	100.0

Effect on weed density

All the treatments were responsible for significant reduction in weed density over control. (Table 2). Oxyfluorfen @0.05kg/ha + 1HW (T_6) recorded the minimum total weed density. Application of oxyfluorfen might have killed the broad leaved seedlings and sedges through contact action and cell membrane disruption. The remaining weeds were removed through hand weeding. These results were in concurrence with Sanbagavalli *et al.* (2016) [6]. Pendimethalin @ 1kg/ha (PE) (T_1) alone as well as integration with 1 HW (T_5) considerably reduced the density of grasses. This was due to its ability to inhibit root and shoot growth of grasses. Imazethapyr@0.12kg/ha (PoE) at 20 DAS along with pre emergence herbicides (T_8 and T_{10}) considerably controlled the broad leaved weeds at 3-4 leaf stage due to its ALS inhibiting action. Similar results were observed by Kalhapure *et al.* (2013).[4] Quizalofopethyl@0.05kg/ha (PoE) at 20 DAS(T_4) was considered more effective in controlling grasses due to the fact that it is readily absorbed and translocated through the plant and inhibits the sensitive ACCaese (Acetyl Co enzyme), leading to interruption of cell membrane production in grasses. Hand weeding twice at 20 and 40 DAS (T_{12}) reduced the weed density but only to a certain extent and it was unable to give long term control. Application of any POE herbicides

Journals Publications First Page

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ORIGINAL PAPER

Structural and proton conductivity study of $BaZr_{1-x}RE_xO_{3-\delta}$ (RE = Dy, Sm) ceramics for intermediate temperature solid oxide fuel cell electrolyte

Avishek Satapathy[1] · Ela Sinha[1] · S.K. Rout[1]

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Abstract
Proton-conducting $BaZr_{1-x}RE_xO_{3-\delta}$ (RE = Dy, Sm) ($x = 0.05, 0.10, 0.15, 0.20$) ceramics were synthesized via a conventional mixed oxide reaction route. The X-ray diffraction patterns indicated that the studied compositions crystallized as a single phase in the cubic space group $Pm\bar{3}m$. The site preference of the rare earth dopant has been proved by Rietveld analysis of the XRD profile, and the site occupancies have been derived for the studied compositions. Thermogravimetric study of the pre-hydrated samples showed a substantial mass loss, proving the oxygen vacancy filling by H_2O after hydration of the samples. Dense microstructures of sintered ceramics are observed, with the Dy-doped compositions showing fairly larger grains (2–3 μm) as compared to Sm-doped barium zirconate. The electrical conductivity under wet N_2 ($P_{H_2O} = 0.031$ atm) environment has been calculated using electrochemical impedance spectroscopy. The conductivity improved gradually with the increase in doping proportions, in case of both the dopants. However, the conductivity of Dy-doped $BaZrO_3$ is found one order higher as compared to Sm-doped $BaZrO_3$, for any fixed doping concentration. The total conductivity of 20% Dy-doped barium zirconate is found to be 4.15×10^{-3} S/cm at 600 °C which is the highest among the studied compositions. The high proton conductivity suggests the material suitable for solid oxide fuel cell electrolyte at intermediate temperatures.

Keywords Proton conductivity · Barium zirconate · Perovskite · Ceramics

Introduction

High-temperature proton-conducting oxides have received significant interest for its widespread advantages in hydrogen technology like solid oxide fuel cells (SOFCs), hydrogen sensors, and steam electrolyzes for hydrogen production [1–3]. SOFC (the name as it is) is an electrochemical device that uses a dense solid electrolyte as its main component, sandwiched between two porous electrodes and works on the principle of electrochemical ionic transport in solids. The electrolytes are generally proton/oxide ion-conducting solids attached with mixed electronic/ionic conductors as electrodes in an electrochemical SOFC device [4, 5]. The high ionic conductivity of the electrolyte and smooth reactions at the electrode-electrolyte interface is crucial for the good efficiency of a SOFC. While typical fluorite structure-based solid oxide-ion conductors require a high temperature (800–1000 °C) to achieve desirable conductivity of the order of 10^{-2} S/cm for better performance, proton-conducting oxides need a relatively lower temperature for the same performance [6–9]. The perovskite-structured $A^{2+}B^{4+}O_3^{2-}$ ceramics like $BaZrO_3$ (BZO) and $BaCeO_3$ substituted with aliovalent rare earth (RE^{3+}) elements on the B^{4+} site show significant protonic conduction at (500–700 °C) intermediate temperatures, when exposed to H_2O or H_2 atmospheres [10–12]. Since $BaZrO_3$ possess advantages with regard to structural and chemical stability than $BaCeO_3$, hence intensive research is done on studying the proton-conducting properties of the former at high temperatures [13–16]. Iwahara et al. were the first to report proton conductivity of $BaZr_{0.95}RE_{0.05}O_{3-\delta}$ (RE = Y, Dy, In, Nd, and Ga) following an increasing trend with increase in the cationic size of the RE-dopant ionic radius (r_i) up to 0.9 Å and then starts decreasing towards larger lanthanide like Nd^{3+} (0.98 Å) [17]. However, a later study on $BaZr_{0.93}RE_{0.07}O_{3-\delta}$ (Y, Ho, Sc, Dy, In, Gd) observed that there

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ROLL NO.	NAMES	Demonstration and criticism		Lesson Plan (PC1)	Lesson Plan (PC2)	Unit Plan		Classroom observation record of peers		Co-Curricular Activities
		5	5	5	5	10	10	10	10	10
11	Bikash Sunar									
12	Dibya Jyoti Raj									
13	Jayant Rituraj									
14	Kabir Srivastava									
15	Kade Mardi									
16	Khirod Chandra Sabar									
17	Khyati Singh									
18	Mamata Yadav									
19	Meghna Nandi									
20	Mihir Datta									

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- Multi-Identities & Populist World
- Yoga & Human Well-Being
- On Human Rights
- Women Empowerment
- Political Parti[illegible]on of Tribal Women

Political Participation of Tribal Women in Odisha

Dr. Kalinga Ketaki*

[Political participation is greater in a 'modern' society than in a more traditional one - or stated in another way, it is greater in a developed than in a developing polity. Political participation has generally been confined to those activities designed to influence decision-making which are carried on within the framework of the particular political system, which are considered to be legitimate and usually which are not of a violent character. But more recently, because of an increase in acts of violence designed both to alter political systems rather fundamentally or to overthrow the systems, violent as well as non-violent, illegitimate as well as legitimate, anti-systematic as well as systematic activities have often been considered to be forms of political participation.]

But, here, in this brief article, we have used political participation in a conventional sense - the positive involvement of tribal women in the political activities/process for their development as well as for the development of the society as a whole. Because on the eve of independence there were three major political tendencies among the tribal people of India - secessionists, separatists and loyalists. Therefore, the purpose of tribal women political participation was integration, with national politics/mainstream - their isolation had to be ended, secessionist, separatist and loyalist politics had to be eliminated.

Demographic status of Tribals in Odisha

Odisha is regarded as the homeland of the Tribals. The tribal population of Odisha is scattered throughout the state but density is more in southern, western and northern districts of Odisha. They are found to be thickly concentrated in the districts of Mayurbhanj, Sundargarh, Nayagarh, Nawrangpur, Malkangiri, Keonjhar, Kalahandi, Kandhamal, Gajapati, Koraput, Nuapada, Balangir and vey sparsely distributed in Cuttack, Kendrapara, Puri, Jajpur.

Majority of them live in hilly and forest regions. Their economy is largely subsistence oriented, non-stratified and non-specialized. Their social system is simple and aspirations and needs are not many. Though the Scheduled Tribes in Odisha have suffered from social, educational and economic backwardness due to geo-historical reasons, they have their own distinctiveness and social-cultural milieu. The process of socio-economic development is going on after independence and has picked up momentum.

Their ethos, ideology, worldview, value-orientation and cultural heritage are rich and varied. At one end of the scale there are nomadic food gatherers and hunters and at the other end, skilled settled agriculturists and horticulturists. The tribal areas of Odisha, therefore, present an extremely diverse socio-economic panorama.

There are 62 varieties of tribes in this state speaking as many as 74 dialects out of which fourteen major tribes may be sorted out, who have distinct cultures of their own and belong to separate racial and linguistic groups. They are Kandha, Gond, Savara, Munda, Godaba, Kolha, Oraon, Kissan, Santal, Paraja, Koya, Bhllyon, Juang and Bonda. Apart from these tribes, other tribes like Korwas, Birhor and the hill Kharies are also found in various places of Odisha. Each tribe possesses distinct identity in terms of social organization, culture, language, customs and traditions.

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Missing basics: a study on sanitation and women's health in urban slums in Lucknow, India

Anushree Nagpal · Mohammad Hassan · Masood Ahsan Siddiqui · Atiqua Tajdar · Mohammad Hashim · Abhra Singh · Suman Gaur

Abstract Sanitation is a multidimensional concept alluding primarily to provision of services for safe disposal of human excreta, provision of clean potable water as well as maintenance of hygiene through judicious means of wastewater and solid waste disposal. This paper aims at studying the accessibility to toilet facilities by 350 slum residents belonging to 308 households, majority of whom are women. These were drawn from 14 selected notified slum colonies of Lucknow city during a field survey conducted in 2017. It was found that 68.42% respondent used shared toilet facilities, followed by private facilities at 10.57%. 19.21% depended on community toilets while 1.8% assented to open defecation. The BMI of women slum residents was found to be positively correlated with usage of private toilets (0.38; $p < 0.01$) and negatively correlated with open defecation (-0.24; $p < 0.01$) both being considered as variables of sanitation conditions. Amongst the socio economic variables, the BMI of women slum residents was found to be positively correlated with median household income (0.64; $p < 0.01$) and negatively correlated with labour as a means of occupation (-0.27; $p < 0.01$). In addition, a composite index was devised in order to assess the level of sanitation and socio economic development in the surveyed city slums. The slums close to the city core were found to be better developed compared to the ones at the periphery.

Keywords Sanitation · Slums · BMI · Women · Lucknow

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> "The day every one of us gets a toilet to use, I shall know that our country has reached the pinnacle of progress."- Jawaharlal Nehru

Introduction

Sanitation is a multidimensional concept alluding primarily to provision of services for safe disposal of

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Original Article

THE HISTOLOGICAL, BIOCHEMICAL AND HEMATOLOGICAL ALTERATION IN ANABAS TESTUDINEUS (CUVIER) EXPOSED TO INSECTICIDE MONOCROTOPHOS.

YELENA ASHAFALI, SHREOSHI HALDAR, DEEPSHIKHA, ANIMESH KUMAR MOHAPATRA & PRIYAMVADA

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ABSTRACT

Monocrotophos is an organophosphorus insecticide widely used in agricultural fields for controlling varieties of insect pests. Extensive use of pesticides has led to contamination of water bodies thereby affecting the aquatic biota. This study was carried out to evaluate the possible histological, biochemical and hematological alterations in Anabas testudineus exposed to sublethal concentration of monocrotophos (45ppm). Histopathological changes in liver like distortion of hepatic parenchyma, pyknotic nuclei, leucocytic infiltration and in kidney like multifocal cloudy, cytoplasmic vacuolation, necrosis of hemopoietic tissues were observed. Biochemical analysis showed increased total tissue protein in the initial period of exposure and then depletion in later stage in hepatic and renal tissues accompanied with enhanced catalase activity. A decrease in total erythrocyte count, hemoglobin content and increased total leucocytes count was observed. The histological, biochemical and hematological alterations led to conclusion that monocrotophos has deleterious effects on Anabas testudineus and may jeopardize the health of other aquatic organisms.

KEY WORDS: Monocrotophos, Protein, Catalase, Erythrocyte, Leucocytes & Liver and Kidney

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INTRODUCTION

In India, pesticides are used extensively in agricultural sector to control pest for improving crop production to meet the high food demand of fast growing population. These pesticides find their way into the aquatic environment mostly through runoff water from agricultural fields and cause various deleterious effects on aquatic biota. The organophosphate pesticides are extremely toxic to non-target species of freshwater fauna that damages the population dynamics, complex food web and food web energetic (Chandra et al., 2001). Bioaccumulations of pesticides affect the survival of fishes by disrupting the ecological relationships between organisms and loss of biodiversity (Abedi et al., 2013). Prolonged exposure of fishes to pesticides induces histopathological damages, biochemical changes and hematological alterations (Mishra et al., 2008; Faggio et al., 2014;Pandey et al., 2014; Ullah et al., 2014; Ullah and Zorriezahra, 2015; Gobi et al., 2018). Several researchers have shown pathological lesions in different tissues of fish due to various pesticide exposure (Cengiz and Unlu, 2006; Ogueji et al., 2013; Zahran et al., 2018).

Severe biochemical and enzymatic alterations have been observed due to secondary metabolites of pesticides in fishes (Rawat etal., 2002; Tiwary and Singh, 2009). Several researchers have reported reduction in tissue protein content under toxicity stress and this might be due to high protein hydrolytic activity because of increased protease activity (Muley et al., 2007; Prasanth and Neelagund (2008); Tiwary and Singh, 2009). The level and activity of antioxidant enzymes like catalase and glutathione peroxidase are affected by toxic pollutants and are used as biomarkers to assess the health of fish (Van der Oost et al., 2003). Hematological parameters are considered

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RESEARCH ARTICLE

EFFECTS OF VITAMIN A AND THYROXINE ON THE METAMORPHOSIS OF INDIAN TREE FROG, *POLYPEDATES MACULATUS*

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Anurans, Metamorphosis,
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Vitamin A.

ABSTRACT

The present study was carried out to investigate and examine the effects of vitamin-A and thyroxine on growth, development and regenerative processes of amputed tails in *Polypedates maculatus*. On exposure to different dosages of vitamin-A, prolonged metamorphosis, regeneration of the amputed tail with visible malformations like bending of tail, formation of bulbular mass and ectopic limb development due to homeotic transformations of tissues were observed. At the same time tadpoles reared in sub-lethal dosages of thyroxine showed enhanced metamorphic changes, disappearance of caudal fin, reduction in growth, abnormality in the development of limbs and loss of pigmentation. Simultaneous exposure of tadpoles to both vitamin-A and thyroxine induced abnormalities like delay in development of hind limbs, emergence of forelimbs, resorption of tail and reduced mortality in comparison to tadpoles of thyroxine group. This study reveals that vitamin-A and thyroxine are antagonistic in nature and on simultaneous exposure to both resulted in intermediate effects on life cycle of *Polypedates maculatus*.

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INTRODUCTION

The amazing discovery on regeneration in anurans under the influence of vitamin A made by Niazi and Saxena (1978) from University of Rajasthan and Mohanty-Hejmadi et al. (1992) from Utkal University open up a new dimension in the field of regeneration research. Since then several workers have started probing the effects of vitamin A on development and regeneration in amphibians. Niazi and Saxena (1978) showed that vitamin A has an inhibitory effect on the regeneration of tail and slowed down the process of metamorphosis in *Bufo andersonii*. Similar inhibitory effect of vitamin A on tail regeneration in *Xenopus laevis, Notophthalmus viridescens* and *Ambystoma mexicanum* was reported by Scadding (1987). Mohanty-Hejmadi et al. (1992) when amputed the tadpole tails of *Uperodon systoma* and exposed them to vitamin A, instead of tail regeneration, limbs appeared at the amputation site. This was for the first time homeotic transformation in anurans was demonstrated. They also reported that vitamin A also delayed the process of metamorphosis. The homeotic transformation was futher extended by Maden (1993) and Muller et al. (1994, 1996) in *Rana temporaria,* Mahapatra and Mohanty-Hejmadi (1994) in *Polypedates maculatus,* Muller et al. (1994) in *Rana ridibunda* and Das (1998) in *Bufo melanostictus.*

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Metamorphosis in amphibians, a complex developmental process is regulated by thyroid hormone (Brown and Cai, 2007). The period of metamorphosis can be differentiated into three stages: pre-metamorphosis, post-metamorphosis and climax. Thyroid gland develops and begins to release thyroid hormone during pre-metamorphosis stage. The level of thyroid hormone rise during post-metamorphosis and initiates morphological changes like development of hindlimbs. In climax stage, the level of thyroid hormone is at its peak and induces rapid metamorphic changes. Researchers like Furlow and Neff (2006) in *Xenopus laevis,* Badawy (2011) in *Ambystoma mexicanum* and Mahapatra et al. (2015) in *Duttaphrynus melanostictus* have shown that exogenous thyroid hormone treatment accelerates metamorphic changes. It is observed that vitamin A and thyroid hormone have opposite effects on metamorphosis in anurans. So far no study has been reported about the effect of both vitamin A and thyroid hormone when administered together on the life cycle of anurans. Keeping this in view, the present study was taken up to investigate the toxic and teratogenic effects of vitamin A and thyroxine administered separately and together on the metamorphosis of *Polypedates maculatus.*

MATERIALS AND METHODS

Polypedates maculatus, the tree frog is a seasonal breeder, breeding only during the monsoon. Depending on rainfall the breeding season extends from July to September. In July 2018,

Analysis Of Junior Race Walking Technique In Relation To Walking Velocity

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ABSTRACT

Pedestrians capable of traveling in excess of 10 miles per hour, they zip along with rhythmic synchronicity (Salvage J. & Seaman T. 2011). The present study aimed to investigate the association and relation of kinematic, physiologic and kinanthropometric properties with the walking velocity. To meet these purpose top 10 race walkers of 10000m race walk event (Men-20) were analyzed, from 33rd National Junior Athletics Championships, 2017 held in Vijayawada. Athletes were recorded as they passed through 4.55 KM on the 400 m track by using two standard digital HD camcorders (Nikon B700, 60Hz). The video data were analyzed by using motion analysis software (KINOVEA 0.8.27).Whereas, kinanthropometric measurements were taken by using the standard Issac procedure. To measure Vo_2 max athlete's performance were taken as they passed through 1.5 miles or 2414.02 m on the track. The result of the study showed that the correlation between race performance and VO_2 max was quite high, r (8df) = 0.726. Quite high and significant positive association were found in stature, shoulder width, lower limb length and foot length with velocity (r = 0.650,0.683,0.741 and 0.670 respectively). A Strong relationship was found between step length and RW performance, i.e. r (8df) = 0.689. Whereas variables like, flight time, linearity, maximum knee and foot height of swing leg were positively correlated with the walking performance. A high degree positive association was located in the torso and pelvic displacement r = 0.768 & 0.804 respectively. In toe off phase "r" value of knee angle with performance was 0.742 that showed a high degree coefficient of correlation. Whereas at heel contact and mid stance phase a low degree negative correlation found (r = -0.489 & -0.406). High degree positive relationship found in ankle angle in heel contact other than rest two phases i.e. r = 0.637. Most of the calculated "r" values were significant as the critical value of 8 df at 0.05 level is 0.631. Due to the direct association of race walking velocity (Mean = 3.427 m/s & SD = 0.235) with VO_2 max, step length, knee angle, torso & pelvic displacement may be this type of result found in different phases. But, the relationships of some kinematic variable with the race walking performance were very much closer to be significantly significant.

Keywords: Pedestrian, heel contact, mid stance, toe off, kinematic, VO_2 max, etc.

Background

IAAF competition rules (2018-2019) 230.2. define Race Walking is a progression of steps so taken that the walker makes contact with the ground, so that no visible (to the human eye) loss of contact occurs. The advancing leg must be straightened (i.e. not bent at the knee) from the moment of first contact with the ground until the vertical upright position.

The 18th and 19th century English tradition of "footmen", who accompanied their masters' coaches on long trips, inspired long distance walking competitions, called pedestrian races, which were first held between 1775 and 1800 in

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CONTENTS

How do Children Learn Mathematics? An Exploration into Mathematics Classroom Processes at Secondary Schools of Bhubaneswar

DHANYA KRISHNAN* AND SAURABH KAPOOR**

Abstract

Considering the change in the perception of mathematics classrooms of India after the emergence of NCF-2005, which emphasises on mathematisation, it is significant to examine mathematics classroom processes. Four secondary schools from Bhubaneswar that are affiliated to CBSE had been selected for the present study. Data was collected using teacher questionnaire, classroom observation and Focus Group Discussion with students. Curricular contents in Mathematics prescribed for Class IX are found quite appropriate, grade specific and properly sequenced as expressed by the teachers. Geometry concepts especially related to Euclidean Geometry are difficult to transact as teachers and students faced problems in understanding these concepts. Although, the resource materials, such as mathematics lab and mathematics kits are available in the majority of schools, their inadequacy from the viewpoint of a large number of students and lack of physical space for storage and use are quite staggering. The preparation of lesson plans/ notes in mathematics is more ritualistic than having any serious and practical pedagogical concern. Methods appropriate to the content and the level of students were found to be used frequently or sometimes by maximum teachers while teaching mathematics. No group activities were conducted and rarely any individual activity took place.

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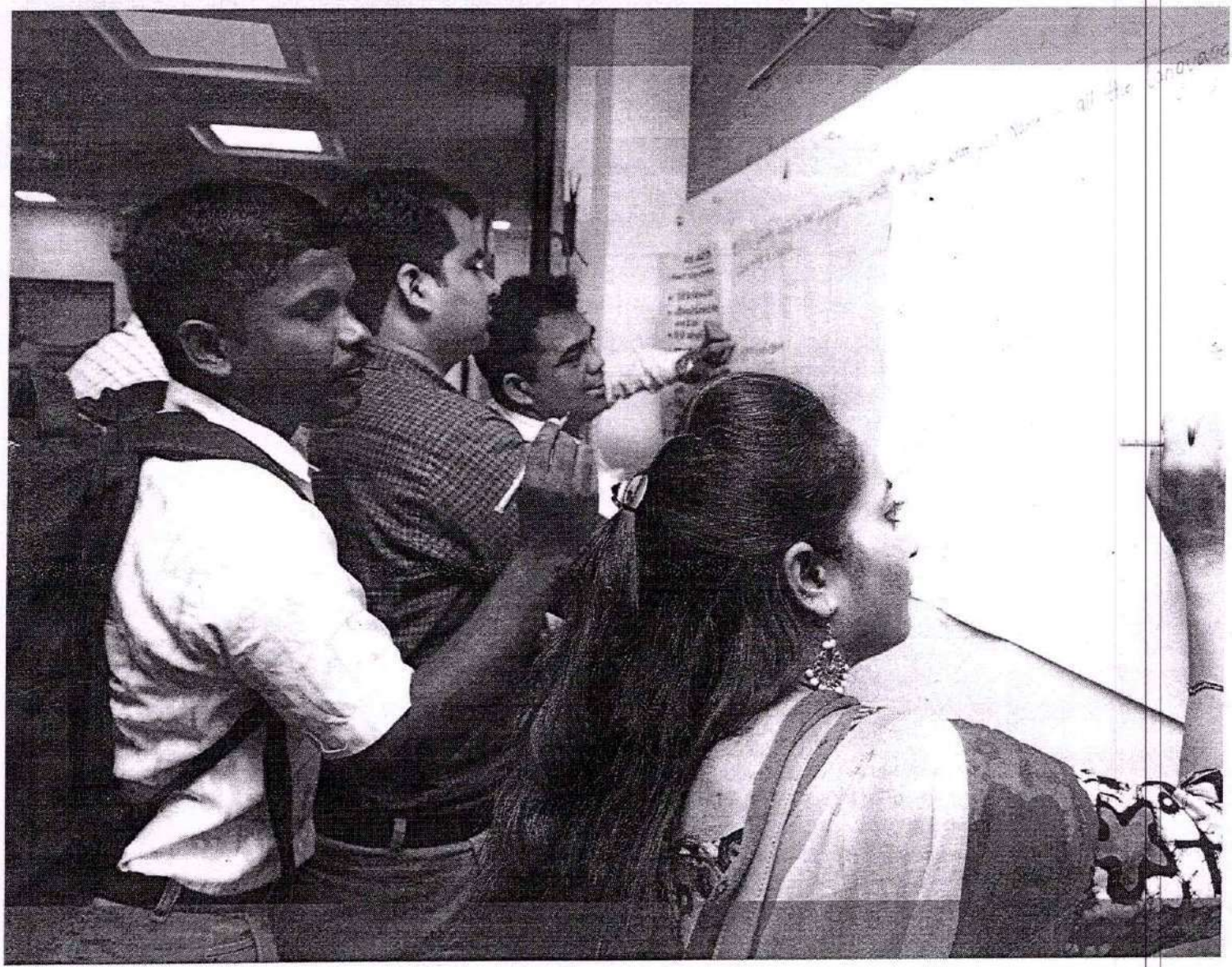
VOICES OF TEACHERS AND TEACHER EDUCATORS



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Contents

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Pedagogical Process in Science at Government Secondary Schools of Odisha

Abstract

Considering the broader aim of Science education as cultivating scientific literacy among citizens of the country by developing a sense of inquiry, rational thinking, and objectivity through varied exploratory activities, examining the process of science learning in schools is very significant. The intention of this paper is to present the findings related to pedagogical processes in Science with respect to content, pedagogical strategy employed, resource management and assessment. In this exploratory research, qualitative survey method has been adopted and 51 schools from 6 districts of Odisha participated. The pedagogical process is captured using classroom observation, FGD with students and interview with Science teachers. A checklist was used to examine the laboratory facilities in the schools. It was found that activity based classes were very limited. A teacher centred process with question and answer session was observed predominantly in the classrooms. Hands on activity as a pedagogic medium was not much explored in the classrooms. However, in a few schools, efforts are made to motivate students by involving them in science exhibition and science quizzes. It was also found that laboratory and ICT tools were not integrated to the teaching-learning processes. More involvement of teachers and their commitment to the profession may lead to better planning of the lesson. The findings indicate that there should be conscious effort from all the stakeholders to revamp science learning processes in Government Secondary schools of Odisha.

Introduction

Science is a human enterprise and it distinguishes from other ways of knowing through the use of empirical standards and logical arguments. In Science, experimentation and theory building complement each other. The process of science depends both on making careful observations of phenomena and on inventing theories for making sense out of those observations. In addition, the processes and ideas of science are of great importance to everybody in varied ways and it helps in taking well-informed decision. Therefore, understanding science and its processes are of great significance. In a progressive forward-looking society, science can play a truly liberating role, helping people escape from the vicious cycle of poverty, ignorance and superstition (NCF, 2005). The opportunities provided at school to understand nature in a more scientific way is one of the most important pre-requisites for the same.

Curriculum and Pedagogical Process in Science at the Secondary Stage

Science, as a compulsory subject in the school curriculum reiterates its epistemological function, in addition to the pragmatically based disposition to contribute to technologically advanced society. At the secondary stage, Science is considered as an interdisciplinary composite subject.

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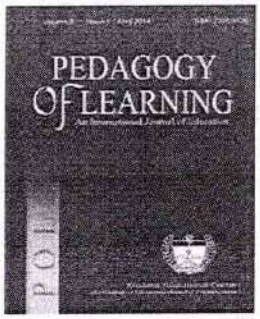

Analysis of English Language Learning Outcome among Tribal Students of Class VIII of Government Schools of Gumla District, Jharkhand

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Abstract

Learning English as the second language raises its own issues in a multicultural society like India due to the diversity of students' socio-cultural background. Considering India as a diverse country with single largest tribal population in the world having specific ethnic uniqueness, attaining expected curricular outcome in English by tribal children also poses greater challenge. In this context, the paper tries to examine learning outcome in English by tribal children of Jharkhand through the lens of learning outcome framework developed by NCERT at elementary level. A descriptive survey was adopted using a qualitative approach to study the learning outcome in English and the problems face by tribal children in learning English with the help of learning outcome test, classroom observation, FGD with students and by interviewing English teachers. 60 students of VIII standard from six government schools of Gumla district and their English teachers had participated in this study. It is found that students have difficulty in understanding and comprehending the language, its grammar and its usage. They read without proper stress and intonation and frame grammatically incorrect sentences without proper use of punctuations and with spelling

errors. The major factors affecting the ELL of tribal students were found to be lack of foundational knowledge of English, dominance of mother tongue or local language in English class, use of traditional teaching-learning methods, lack of resources and facilities in school and home, irregularity of students and lack of parental support and the family. Language learning outcome of tribal learners is found to be inadequate and appropriate pedagogical practices have to be adopted to ensure better quality learning. Efforts from all the stake holders are to be geared towards bridging the gap in learning outcomes of tribal learners.

Keywords: English Language Learning, Learning Outcome, Tribal Education.

INTRODUCTION

English is recognized as a language of globalization and modernization. It is one of the languages used for communication and exchanging our views and thoughts with the whole world. In a culturally diverse and multilingual country like India, English acts as a medium to bridge the linguistic gap that persists among the people and their communities. Its importance is reflected in The National Focus Group Position Paper on Teaching of English (2005) which states, "English is in India today a symbol of people's aspirations for quality in education and a fuller participation in national and international life". English language learning has been emphasized in the present school curriculum as it prepares the individuals to face the global scenario. This has made many states to grant early introduction of English in state schools to meet the demands of people (Dutta & Bala, 2012). As per National Curriculum Framework- 2005, at the initial stages, "English may be one of the languages for learning activities that create the child's awareness of the world". However, the challenge of providing quality learning experience to children especially who belong to scheduled tribe population, one of the most marginalized and underprivileged group in India residing in the rural pockets of the country is alarming. The Scheduled Tribe population constitutes the single largest tribal population in India with a population of more than 10.2 crores (Census of India, 2011). Proficiency in English will not only help the tribal students to pursue higher education but also act as a means for upward social mobility.This in turn would help them face new challenges and sustain their lives in this competitive world.

English Language Education of Tribal Learners

India has one of the single largest tribal populations in the world. The Scheduled Tribe population is primarily rural as majority of them reside in villages. Tribal children are trapped in an intergenerational vicious cycle of poverty, illiteracy and deprivation due to their primitive (shy) nature and thus remain isolated from the mainstream of life and other strata of the society (Roy, 2012). The education of the tribal children has been neglected due to lack of awareness and ignorance among the tribal population. The economic and social deprivation of the tribes is reflected in their educational backwardness. In spite of various initiatives taken by government to overcome educational backwardness of tribal groups, a vast majority of tribal population in India remains outside the education system (Varghese & Nagaraj, 2013). Education helps in the overall development of individuals and creates a sense of awareness leading to a better comprehension of their social, political and cultural environment. However, teaching English as a second language in tribal areas is a great challenge due to the diversity of the students' socio-cultural background, motivation and

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Finite Amplitude Analysis of Maxwell Fluid in Porous Medium in Presence of Soret and Dufour Effects under LTNE Model

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Abstract—*In this paper the finite amplitude analysis is done for the double diffusive free convection of Maxwell viscoelastic fluid in a porous medium in the presence of temperature gradient (Soret effects) and concentration gradient (Dufour effects) under LTNE model is investigated. The normal mode analysis is adopted for the linear stability analysis. The nonlinear analysis using a truncated representation of Fourier series considered only for two terms. The heat and mass transport phenomena is also depicted in this work. Graphical representation of physical parameter is also given in this paper.*

1. INTRODUCTION

Double diffusive convection in a horizontal layer of Maxwell viscoelastic fluid in a porous medium in the presence of temperature gradient (Soret effects) and concentration gradient (Dufour effects) is investigated. For the porous medium Darcy model is considered. A linear stability analysis based upon normal mode technique is used to study the onset of instabilities of the Maxwell viscolastic fluid layer confined between two free-free boundaries. Rayleigh number on the onset of stationary and oscillatory convection has been derived and graphs have been plotted to study the effects of the Dufour parameter, Soret parameter, Lewis number, and solutal Rayleigh number on stationary convection. The finite amplitude analysis is also done in this work for the flow stability

Non-Newtonian fluids have been a famous topic of research for their diverse use in many industrial processes, such as polymer solutions, blood, and heavy oils. These fluids have been modeled in a number of diverse manners with their constitutive equations varying greatly in complexity, among which the viscoelastic Maxwell fluid model has been studied widely[1–3]. The Maxwell fluid has achieved some successes in describing polymeric liquids, in which case it is more amenable to analysis and more important to experiments. The relaxation and retardation functions were determined for the four-parameter Maxwell model by Friedrich[4]. Song and Jiang[5] used the fractional calculus to analyze the experimental data of viscoelastic gum and obtained satisfactory results.

Qi and Xu[6–7] considered Stokes' first problem and some unsteady unidirectional flows for a viscoelastic fluid with the generalized Oldroyd-B model. Zheng et al.[8–9] considered some MHD flows of the generalized viscoelastic fluid. Shen et al.[10–11] studied the decay of vortex velocity and diffusion of temperature in a generalized second grade fluid and a Reyleigh-Stokes problem for a heated generalized second grade fluid with the fractional derivative. Recently, some new energy constitutive equation models have been proposed by Ezzat[12]

2. MATHEMATICAL FORMULATIONS OF THE PROBLEM

Consider an infinite horizontal layer of Maxwell viscoelastic fluid of thickness "d," confined between the planes $z = 0$ and $z = d$ in a porous medium of porosity ε and medium permeability

k 1 and is acted upon by gravity $\mathbf{g}(0, 0, -g)$. This layer of fluid is heated and soluted in such a way that a constant temperature and concentration distribution is prescribed at the boundaries of the fluid layer. The temperature (T) and concentration (C) are taken to be T 0 and C

0 at $z = 0$ and T=1 and C be the difference in temperature and concentration across the boundaries.

Let $\mathbf{q}(u, V, w)$, p, ρ, T, C, α, α□, μ, κ, and κ□ be the Darcy velocity vector, hydrostatic pressure, density, temperature, solute concentration, coefficient of thermal expansion, an analogous solvent coefficient of expansion, viscosity, thermal diffusivity, and solute diffusivity of fluid, respectively.

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Hyers Ulam Stability of First Order Difference Equations

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Abstract— *In this paper we have investigate the Hyers Ulam stability of first order difference equation of the form* $\Delta y(n) - y(n) = 0$.

1. INTRODUCTION

The study of stability problems for various functional equations originated from a talk given by S.M. Ulam in 1940 [17], Ulam discussed a number of important unsolved problems. Among such problems, a problem concerning the stability of functional equations, "Give conditions in order for a linear mapping nearly an approximately linear mapping to exist" is one of them.

In 1941, Hyer [2] gave an answer to the problem as follows:

Let E_1 and E_2 be two real Banach spaces and $f: E_1 \to E_2$ be a mapping. If there exists an $\in > 0$ such that

$$\left\|f(x+y)-f(x)-f(y)\right\| < \varepsilon, (x, y \in E_1)$$

Then there exists a unique additive mapping $T: E_1 \to E_2$ such that $\left\|f(x)-T(x)\right\| < \varepsilon, x \in E_1$

Furthermore, the results of the Hyers has been generalized by Rassias [14]. After that researchers has extended, the Ulams stability problems to functional equations and generalized Hyer's result in various directions (see[3, 8, 9, 15]). Thereafter, Ulam's stability problem for functional equations was replaced by stability of differential/difference equations.

The differential equation,

$$a_n(t)y^n(t) + a_{n-1}(t)y^{n-1}(t) + \ldots + a_1(t)y^1(t) + a_0(t)y(t) + h(t) = 0$$

has Hyper's Ulam stability, if for given $\in > 0$, I be an open interval and for any function f satisfying the differential inequality,

$$\left|\begin{matrix} a_n(t)y^{(n)}(t) + a_{n-1}(t)y^{(n-1)}(t) + \ldots + a_1(t)y^1(t) \\ + a_0(t)y(t) + h(t) \end{matrix}\right| \le \varepsilon,$$

then there exists a function f(t) of the above equation such that $\left|f(t) - f_0(t)\right| \le K(\in)$ and $\lim_{\varepsilon \to 0} K(\varepsilon) = 0, t \in I.$

If the proceeding statements is also true when we replace ε and $K(\varepsilon)$ by $\phi(t)$ and $\psi(t)$ respectively, where $\phi, \psi : I \to [0, \infty)$ are functions independent of f and f_0 explicitly, then we say that the corresponding differential equation has the generalized Hyers-Ulam stability or Hyer's Ulam Rassias stability.

Definition 1: The difference equation

$$a_k(n)y(n+k) + a_{k-1}(n)y(n+k-1) + \ldots + a_1(n)y(n+1) + a_0(n)y(n) + h(n) = 0$$

has the Hyer's Ulam stability, if forgiven $\in > 0, I$ be an open interval and for any function f satisfying the inequality,

$$\left|\begin{matrix} a_k(n)y(n+k) + a_{k-1}(n)y(n+k-1) + \ldots \\ + a_1(n)y(n+1) + a_0(n)y(n) + h(n) \end{matrix}\right| \le \varepsilon$$

then there exists a solution f_0 of the above difference equation such that $\left|f(n) - f_0(n)\right| \le K(\in)$ and $\lim_{\in \to 0} K(\in) = 0$ for $n \in I$.

On Hyer's Ulam stability, several works have been done in the field of differential equation. Obloza seems to be the 1st author

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Linear Stability Analysis of Thermo-Solutal Couple-Stress Fluid Flow with Linear Heating in Porous Medium

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Abstract—*The onset of double-diffusive convection in a couple-stress fluid-saturated with horizontal porous layer is analysed by using linear and weak nonlinear stability analyses. It is obtained that the couple-stress parameter and the solute Rayleigh number have a stabilizing effect on stationary, oscillatory and finite-amplitude convection. The heat and mass transfer decreases with an increase in the values of couple-stress parameter and diffusivity ratio, while both increase with an increase in the value of the solute Rayleigh number.*

1. INTRODUCTION

The study of convective flow of thermo-solutal couple-stress fluid in darcy porous medium with heat and mass transfer under the influence of chemical reaction with heat source has practical applications in many areas of science and engineering. Natural convection flows occur frequently in nature due to temperature differences, concentration differences, and also due to combined effects. The concentration difference may sometimes produce qualitative changes to the rate of heat transfer. Recently, the equally problem of hydromagnetic convective flow of a conducting fluid through a porous medium has been investigated.

Many important developments in literature of stability theory are given by, Chandrasekhar(1981), Nield and Bejan (2012). Bhadauria et al. (2012) has made the stability analysis of convection in a binary fluid-saturated horizontal porous layer with internal heat source. Recently, viscoelastic fluid flow in porous media has attracted considerable attention, due to the large demands of such diverse fields as biorheology, geophysics, chemical industries, and petroleum industries. Also Bhadauria group (2012),(2013) have studied the problem of thermal instability in porous media with internal heating, considering various physical models. Cimpean (2012), analyzes the mixed convection flow of a nanofluid in an inclined channel filled with a porus medium. The main focus was on the effects of the main parameters, such as solid volume fraction of the nanoparticles, the mixed convection parameter, the Péclet number and the inclination of the channel to the horizontal, on the thermal performances of the flow. Gaikwad and Kamble (2012) have investigated the Soret effect on double diffusive convection in a horizontal sparsely packed porous layer. Narayana et al. (2012) studied the linear and weakly nonlinear stability analysis of double-diffusive convection in a porous medium saturated by a Maxwell fluid in the presence of cross diffusion effects. The effects of the Soret and Dufour parameters on the onset of double diffusive convection in a Maxwell fluid are investigated under the assumption of a single phase model with local thermal equilibrium (LTE) between the porous matrix and the Maxwell fluid. Harfash (2013) studied double-diffusive convection in a reacting fluid with a concentration and magnetic field effect–based internal heat source by using linear instability analysis and nonlinear stability analysis and using the finite element method of p order. Further Nygard et al. (2013) done a computational study on turbulent flow through an abrupt axisymmetric contraction. Rana (2014) studied the thermal convection in couple-stress fluid in hydromagnetics saturating a porous medium and found that couple-stress parameter has stabilizing effect on the system. The onset of convection in a horizontal layer heated from below (Bénard problem) for a nanofluid was studied by Rana et al. (2014). Kumar et al.(2015) investigated the thermosolutal convection in a viscoelastic dusty fluid with hall currents in porous medium. Kumar et al.(2016) studied the effects of horizontal magnetic field and rotation on thermal instability of a couple-stress fluid through a porous medium. Singh et al.(2016) analysed the the transport of vorticity in magnetic Maxwellian viscoelastic fluid -particle mixtures in porous medium. Chand et al.(2017), investigated the thermal instability in a layer of couple stress nanofluid saturated porous medium and also studied the thermal instability in a horizontal layer of Couple-stress nanofluid in a porous medium for more realistic boundary conditions. Kumar et al.(2017) studied the effect of horizontal magnetic field and horizontal rotation on thermo-solutal stability of a dusty couple-stress fluid through a porous medium: a brinkman model. Rana et al.(2018) studied the stability analysis of double-diffusive convection in a couple stress nanofluid. Singh M.(2018), investigated the double-diffusive convection of synovial (couple-stress) fluid in the presence of hall current through a porous medium and studied the effect of Hall

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Study of Double Diffusive MHD Natural Convective Flow from a Vertical Flat Plate in Porous Medium using Laplace Transform

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Abstract—*The present paper reports the analytical study of Double Diffusive MHD free convective flow in vertical flat plate in porous medium. The physical model is written in the form of coupled PDE. The similarity transformation technique is adopted to transform the PDE in to the system of ODE. The Laplace transform method is adopted to find the solution of system of ODE. The graphical approach is taken into account to explain the impact of distinguished physical parameter.*

Keywords: *MHD, Double Diffusive, Porous Medium, Laplace Transform.*

1. INTRODUCTION

Combined effect of heat and mass transfer by free convective flow in a fluid saturated porous medium has received remarkable attention during the last decades. This is only due to the importance of this process which leads to many engineering application like, geophysical and natural systems of practical interest such as geothermal energy utilization, thermal energy storage and recoverable systems and petroleum reservoirs. This has been shown effectively that, the simultaneous occurrence of heat and mass transfer between the fluxes, the driving potential is become more intricate nature. A clear understanding of the nature of the interaction between thermal and mass or solutal concentration buoyancy forces is necessary in order to control these processes. **Chaudhary and Jain [10]** studied the MHD flow past an infinite vertical oscillating plate through porous medium with the presence of free convection and mass transfer analytically by using Laplace-transform technique. **Mohamed [9]** analyzed the double-diffusive convection-radiation interaction for the unsteady MHD flow over a semi-infinite vertical moving porous plate embedded in a porous medium in the presence of thermal &solutal diffusion and heat generation. A numerical study of the unsteady free convection and mass transfer flow of an electrically conducting fluid past an infinite vertical porous plate in the presence of a transverse magnetic field was presented by **Shariful et. [6]. Bukhari, [2]**applied a linear stability analysis, with basic flowa fluid layer overlying a porous layer. **Saha&Hossain [11]** studied numerically the laminar doubly diffusive free convection flows along an isothermal vertical finite plate immersed in a stable thermally stratified fluid by using an implicit finite difference method and local non-similarity method. **Hajri et. al. [3]** presented a numerical simulation for the steady double-diffusive natural convection in a triangular cavity by using equal finite elements method. A numerical study was presented from **Mamouet. al. [5]** for the unsteady double-diffusive convection in a two-dimensional horizontal confined enclosure by using the finite element technique.. **Khanafer and Vafai, [4]** presented a numerical study of mixed-convection heat and mass transport in a lid-driven square enclosure filled with a non-Darcian fluid-saturated porous medium by using the finite volumes technique.

2. THE MATHEMATICAL MODEL

The model of the problem is presented Fig1. Here, this has been considered a steadystate, two dimensional laminar natural convective boundary layer flow of a incompressible vertical flat plate. The plate is electrically and fluid is viscosity dependent. This also be assumed that the temperature past a semi infinite vertical impermeable flat plate in presence of uniformly distributed transverse magnetic filed of strength H_o in the porous medium. The impact is take nunder the Bousineqess approximation. The physical conditions are taken in X-Y plane. The boundary layer flow is taken care in Y-direction only. Keeping in view of the above conditions .The basic equations are given below with respect to x and y axis.

3. THE GOVERNING EQUATION

$$\frac{\partial u}{\partial x}+\frac{\partial v}{\partial x}=0 \tag{1}$$

$$u\frac{\partial u}{\partial x}+v\frac{\partial u}{\partial y}=v\frac{\partial^2 u}{\partial y^2}+g\beta(T-T_\infty)-\frac{\sigma u H_0^2}{\rho_\infty}-\frac{\mu}{k_p}u \tag{2}$$

$$u\frac{\partial T}{\partial x}+v\frac{\partial T}{\partial y}=\frac{\kappa}{\rho_\infty C_p}\frac{\partial^2 T}{\partial y^2} \tag{3}$$

$$u\frac{\partial S}{\partial x}+v\frac{\partial S}{\partial y}=\varepsilon\frac{\partial^2 S}{\partial y^2} \tag{4}$$

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Numerical Investigation on Natural Convection in a Sinusoidal Corrugated Inclined Enclosure Due to Effects of a Longitudinal Magnetic Field

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Abstract—*A comprehensive numerical investigation on the natural convection in a tilted sinusoidal corrugated inclined enclosure due to effects of a longitudinal magnetic field is presented. In this analysis, two sinusoidal corrugated side walls are maintained at a constant low temperature whereas a constant heat flux source whose length is varied from 20% to 80% of the total length of the enclosure is discretely embedded at the bottom wall. The finite element method has been used to solve the governing differential equations of the fluid medium in the enclosure in order to investigate the effects of the variation of inclination angles, the presence of a longitudinal magnetic field and different discrete heat source size ratios on heat transfer process for different values of Rayleigh and Hartmann numbers. Results are presented in the form of streamline as well as temperature profile. It is concluded that the average Nusselt number increases as the heat surface length decreases, while the enclosure inclination angle has a clear effect on the heat transfer process for low heat source lengths in case of low buoyancy and magnetic effects. The dominance of Hartmann number is found to be significant with the purpose of reducing heat transfer process as well as minimizing the influence of inclination angles at low Rayleigh number.*

Keywords: *MHD natural convection, longitudinal magnetic field, corrugated enclosure, Hartmann number.*

Nomenclature

B_o	magnitude of the magnetic field [T]
g	gravitational acceleration [ms^{-2}]
Ha	Hartmann number
k	thermal conductivity of fluid [$Wm^{-1}K^{-1}$]
L	length of the heat source [m]
Nu	average Nusselt number
p	pressure [Nm^{-2}]
P	dimensionless pressure
Pr	Prandtl number
q	heat flux [Wm^{-2}]
Ra	Rayleigh Number
T	temperature [K]
T_c	temperature of the cold surface (K)
u, v	velocity components in x and y-direction [ms^{-1}]
U, V	dimensionless velocity components in X, Y-direction
W	length of the enclosure [m]
x, y	Cartesian co-ordinates [m]
X, Y	dimensionless Cartesian co-ordinates
Greek symbols	
α	thermal diffusivity [m^2s^{-1}]
β	coefficient of volumetric thermal expansion [K^{-1}]
ε	discrete heat source size ratio
θ	dimensionless temperature
μ	dynamic viscosity of fluid [$kgm^{-1}s^{-1}$]

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MHD DOUBLE DIFFUSIVE CONVECTIVE FLOW PAST A LOW - HEAT - RESISTANCE SHEET WITH SORET - DUFOUR EFFECTS UNDER CHEMICALLY REACTION

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Abstract—*In this manuscript an attempt has been taken to understand the variation in velocity, temperature and concentration for double diffusive MHD chemically reacting free convective fluid flow past a low heat resistance sheet after inclusion of soret and dufor parameter. The boundary layer flow in viscous media is presented in terms of physical model which is transformed in the set of Coupled Ordinary differential equation using similarity transformation. The set of differential equation solved numerically using spectral collocation method. The main emphasis is given on the Varity of physical parameters while change in soret and dufor parameter. The velocity, temperature and stream function is plotted w.r.t to different physical parameter w.r.t the soret and dufor parameters. The internal heating is neglected in this work since it has no meaning when the solutal is dominated over heat effect. A detailed study is made in this work for physical parameter to understand the physical changes while inclusion soret & duffor parameter*

Keywords: *MHD, Double diffusive, Sorer-Duffor.*

1. INTRODUCTION

Heat and mass transfer play an important role in manufacturing industries for the design of fins, steel rolling, nuclear power plants, gas turbines and various propulsion devices for aircraft, combustion and furnace design, materials processing, energy utilization, temperature measurements. . A number of studies have been reported in the literature focusing on the problem of mixed convection about different surface geometries in porous media Extensive reviews on this subject can be found in the books by Ingham and Pop (2005), Vafai (2005), Nield and Bejan (2006).

It is well known that most fluids which are encountered in chemical and allied processing applications do not satisfy the classical Newton's law and are accordingly known as non-Newtonian fluids. Due to the important applications of non-Newtonian fluids in biology, physiology, technology, and industry, considerable efforts have been directed toward the analysis and understanding of such fluids.

Bejan and Khair (1985) studied the buoyancy induced heat and mass transfer from a vertical plate embedded in a saturated porous medium. Rami. Y. Jumah et al. (2013) studied the coupled heat and mass transfer for non-Newtonian fluids. Kumari (2001) analyzed the effect of variable viscosity on free and mixed convection boundary layer flow from a horizontal surface in a saturated porous medium. Postelnicu et al. (2001) investigated the effect of variable viscosity on forced convection over a horizontal flat plate in a porous medium with internal heat generation. Seddeek (2005), studied the effects of chemical reaction, variable viscosity, and thermal diffusivity on mixed convection heat and mass transfer through porous media. Mohamed E- Ali (2006) studied the effect of variable viscosity on mixed convection along a vertical plate. Alam et al (2006) analyzed the study of the combined free - forced convection and mass transfer flow past a vertical porous plate in a porous medium with heat generation and thermal diffusion

Coupled heat and mass transfer by natural convection in a fluid saturated porous medium has received great attention during the last decades due to the importance of this process which occurs in many engineering, geophysical and natural systems of practical interest such as geothermal energy utilization, thermal energy storage and recoverable systems and petroleum reservoirs. When heat and mass transfer occurs simultaneously between the fluxes, the driving potential is of more intricate nature, as energy flux can be generated not only by temperature gradients but by composition gradients as well. The energy flux caused by a composition gradient is called the Dufour or diffusion-thermo effect. Temperature gradients can also create mass fluxes, and this is the Soret or thermal-diffusion effect. The Dufour and Soret effects were neglected in many reported research studies, since they are of a smaller order of magnitude than the effects described by Fourier's and Fick's laws. Anghel et al(2000) investigated the Dufour and Soret effects on free convection boundary layer over a vertical

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VELOCITY VARIATION IN MHD DOUBLE DIFFUSIVE CHEMICALLY REACTIING OF A MICROPOLAR FLUID FLOW IN A POROUS MEDIUM

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Abstract—*This present paper reports the study of the free convection, double diffusive incompressible micropolar fluid flow between two vertical parallel plates containing a Darcy-Forchheimer porous medium. Asymmetric wall temperatures and concentrations are present and take into account a temperature-dependent variable thermal conductivity. The similarity transformation approach is adopted to transformed system of non linear PDE equations to ODE which is named as linear momentum, angular momentum, energy and species. Computational simulation using the finite element method is done for the system of coupled differential equations. The effects of Darcy number (Da), Forchheimer number (Fs), Grashof number (Gr) and thermal conductivity parameter (S) on the velocity, angular velocity and temperature / concentration profiles are studied in detail. A comparison with another method has also been presented to show the compatibility of the proposed method..*

1. INTRODUCTION

Free convection in fluid saturated porous media constitutes an area of major activity in transport phenomena research owing to its application in a diverse number of fields including geothermal energy systems, enhanced recovery in petroleum reservoirs, filtration sciences, heat exchange between soil and atmosphere, transport of moisture through porous industrial materials and ceramic processing. The fundamental importance of convective flow in porous media has been well-reviewed in the recent book by Ingham and Pop(2002),Nield and Bejan (1999) have also addressed in detail the natural convective flows due to combined buoyant mechanisms in porous media. Rawat (2012) focused to develop a mathematical model for the comparative study of combined effects of free convective heat and mass transfer on the steady two-dimensional, laminar fluid flow past a moving permeable vertical surface subjected to a transverse uniform magnetic field. Rawat (2016) investigates the two dimensional flow, heat and mass transfer of chemically reacting Micropolarfluid over a non-linear stretching sheet with variable heat flux in a non-darcy porous mediumRawat&Kaoor (2017) studied Study of buoyancy driven free convective flow of a micropolar fluid through adarcy-forchheimer porous medium with mutable thermal conductivity.

The objective of the present investigation is to study numerically the natural convection heat and mass transfer of a fully developed micropolar fluid flow in a Darcy-Forchheimer porous medium for asymmetric wall temperatures and concentrations with temperature-dependent thermal conductivity. The governing partial differential equations for the flow are transformed and solved using finite element method. The model finds applications in polymer technology, aerodynamic heating, geophysics and ceramic processing..

2. MATHEMATICAL MODEL

Consider the laminar natural convection flow between two vertical plates in a homogenous, incompressible, micro polar fluid-saturated porous medium with temperature dependent thermal conductivity. The vertical plates are separated by a distance b with reference to an x, y coordinate system, where the x-axis is directed along the vertical plates and the y-axis is transverse to this. It is assumed that the two walls are maintained at different temperatures and concentrations resulting in an *asymmetric* situation with respect to temperature and concentration respectively. The flow is also assumed steady and fully developed i.e. transverse

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EFFECT OF VITAMIN A ON THE REGENERATION OF HIND LIMBS IN THE TADPOLES OF RANA BREVICEPS

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ABSTRACT

The last three decades have witnessed an explosion of research on the effect of retinoid (vitamin A derivatives) on the pattern formation in the regenerating amphibian limbs and various other developing systems in vertebrates. The effects of exogenous vitamin A palmitate on limb development and regeneration in anuran tadpoles is very significant as it causes regeneration of complete or nearly complete limbs instead of only the missing distal part altering the proximo-distal pattern of regeneration. Several researchers have reported that vitamin A has an inhibitory effect on tail regeneration from the site of tail amputation but induces the development of ectopic limbs from tail blastema following treatment in the limb bud stage of anuran tadpoles. Such remarkable homeotic transformations have been demonstrated in several anuran species upon treatment with vitamin A. In the present study, investigators have made an attempt to assess the effect of vitamin A on limb regeneration after limb amputation in anuran tadpoles. The mortality was higher in group II than group I. The process of limb regeneration was faster in tadpoles of exposed group in comparison to tadpoles of control group. In group I tadpoles (exposed for 48 hrs) showed normal limb development while in tadpoles of group II (exposed for 96 hrs), majority developed hind limb with thigh, shank and ankle with digits but about 25% of tadpoles showed abnormality in the number of digits. The present findings clearly indicate that vitamin A has a positive effect on the blastema which formed at the site of amputation in replacing the structures appropriate to its proximo-distal position.

KEYWORDS: Regeneration, blastema, homeotic transformation, anuran, ectopic limbs.

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RESEARCH ARTICLE

EFFECTS OF VITAMIN A AND THYROXINE ON THE METAMORPHOSIS OF INDIAN TREE FROG, *POLYPEDATES MACULATUS*

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ABSTRACT

The present study was carried out to investigate and examine the effects of vitamin-A and thyroxine on growth, development and regenerative processes of amputed tails in *Polypedates maculatus*. On exposure to different dosages of vitamin-A, prolonged metamorphosis, regeneration of the amputed tail with visible malformations like bending of tail, formation of bulbular mass and ectopic limb development due to homeotic transformations of tissues were observed. At the same time tadpoles reared in sub-lethal dosages of thyroxine showed enhanced metamorphic changes, disappearance of caudal fin, reduction in growth, abnormality in the development of limbs and loss of pigmentation. Simultaneous exposure of tadpoles to both vitamin-A and thyroxine induced abnormalities like delay in development of hind limbs, emergence of forelimbs, resorption of tail and reduced mortality in comparison to tadpoles of thyroxine group. This study reveals that vitamin-A and thyroxine are antagonistic in nature and on simultaneous exposure to both resulted in intermediate effects on life cycle of *Polypedates maculatus*.

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INTRODUCTION

The amazing discovery on regeneration in anurans under the influence of vitamin A made by Niazi and Saxena (1978) from University of Rajasthan and Mohanty-Hejmadi et al. (1992) from Utkal University open up a new dimension in the field of regeneration research. Since then several workers have started probing the effects of vitamin A on development and regeneration in amphibians. Niazi and Saxena (1978) showed that vitamin A has an inhibitory effect on the regeneration of tail and slowed down the process of metamorphosis in *Bufo andersonii*. Similar inhibitory effect of vitamin A on tail regeneration in *Xenopus laevis*, *Notophthalmus viridescens* and *Ambystoma mexicanum* was reported by Scadding (1987). Mohanty-Hejmadi et al. (1992) when amputed the tadpole tails of *Uperodon systoma* and exposed them to vitamin A, instead of tail regeneration, limbs appeared at the amputation site. This was for the first time homeotic transformation in anurans was demonstrated. They also reported that vitamin A also delayed the process of metamorphosis. The homeotic transformation was futher extended by Maden (1993) and Muller et al. (1994, 1996) in *Rana temporaria*, Mahapatra and Mohanty-Hejmadi (1994) in *Polypedates maculatus*, Muller et al. (1994) in *Rana ridibunda* and Das (1998) in *Bufo melanostictus*.

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Metamorphosis in amphibians, a complex developmental process is regulated by thyroid hormone (Brown and Cai, 2007). The period of metamorphosis can be differentiated into three stages: pre-metamorphosis, post-metamorphosis and climax. Thyroid gland develops and begins to release thyroid hormone during pre-metamorphosis stage. The level of thyroid hormone rise during post-metamorphosis and initiates morphological changes like development of hindlimbs. In climax stage, the level of thyroid hormone is at its peak and induces rapid metamorphic changes. Researchers like Furlow and Neff (2006) in *Xenopus laevis*, Badawy (2011) in *Ambystoma mexicanum* and Mahapatra et al. (2015) in *Duttaphrynus melanostictus* have shown that exogenous thyroid hormone treatment accelerates metamorphic changes. It is observed that vitamin A and thyroid hormone have opposite effects on metamorphosis in anurans. So far no study has been reported about the effect of both vitamin A and thyroid hormone when administered together on the life cycle of anurans. Keeping this in view, the present study was taken up to investigate the toxic and teratogenic effects of vitamin A and thyroxine administered separately and together on the metamorphosis of *Polypedates maculatus*.

MATERIALS AND METHODS

Polypedates maculatus, the tree frog is a seasonal breeder, breeding only during the monsoon. Depending on rainfall the breeding season extends from July to September. In July 2018,

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Monocrotophos induced histopathological and biochemical Changes in gills, stomach and intestine of *Anabas testudineus* (Cuvier)

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Abstract
Monocrotophos, an organophosphate pesticide is used frequently in paddy fields of India. Although its impact of toxicity has been reported in many organisms, its effect on digestive and respiratory organs in *Anabas testudineus* is scanty. The Present investigation was conducted to evaluate the impact of histopathological and biochemical indices on freshwater fish *A.testudineus* exposed to sub-lethal concentration (45 ppm) of an organophosphorous pesticide monocrotophos (MT). Severe histoarchitectural and biochemical changes were observed in fishes exposed to monocrotophos when compared to fishes of control group. Exposure of fishes to the pesticide resulted in induction of histological abnormalities in gills, stomach and intestine. This was accompanied with reduction in total protein content and an elevation in catalase activity in gills, stomach and intestine. These structural alterations of the gills, stomach and intestine could affect respiration, digestion and absorption of nutrients which in turn could adversely affect growth and survival of the freshwater fish *A. testudineus*. The result of this investigation serves as a biomonitoring tool for the effects of organophosphorous pesticide MT on the aquatic biota.

Keywords: Catalase, Gills, Histopathology, Intestine, Monocrotophos, Protein, Stomach

INTRODUCTION

Freshwater ecosystem has been polluted by continuous discharge of wastewater from agricultural practices. The wastewater contains various amounts of chemical substances, such as pesticides that results in potential health hazards to live stock, especially fishes. Fishes are among the group of non-targeted aquatic organism. They serve as bioindicator of water quality and the effect of pesticides can be studied by analysing the histoarchitecture and biochemical parameters of various organs (Rao and Pillai, 2001; Bartoskova *et al.*, 2013; Faggio *et al.*, 2014a, b; Gobi *et al.*, 2018. A wide variety of pesticides and insecticides are used in agricultural fields (Sumithion, Lorsbon, Aluminium chloride, Endosulfan, Monocrotophos, Chlorpyrifos, Dichlorvos, Almix 20WP, Profenofos, Diethylphthalate, Dimethoate, Phosalone). Among them monocrotophos, an organophosphorous pesticide is used by many for rice cultivation as it is cost effective.

Review of available literature on fish and environmental pollutants indicate that the sub-lethal doses of most of the pesticides cause behavioural changes, varying extent of histopathological injuries to different organs in fishes and biochemical changes; the amount of damages are usually dependent on dose, duration of exposure and type of pesticide (Tilak *et al.*, 2005; Cengiz and Unlu, 2006; Mishra *et al.*, 2006, 2008; Ghanbahadur and Ghanbahadur, 2012; Oguei *et al.*, 2013; Senapati *et al.*, 2013; Pandey *et al.*, 2014; Ullah *et al.*, 2014; Ullah and Zorriehzahra, 2015). Recently, Marigoudar *et al.* (2018), and Zahran *et al.* (2018) reported that chlorpyrifos induced patho-

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Smart Classroom for Teaching Learning at Secondary Level in West Bengal: An Exploratory Study

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ABSTRACT

The objectives of this paper are to study the availability of equipments and softwares in smart clasrrom and to find out the ICT training of teachers and use of different educational applications by teachers in teaching. Survey method was used with sample of 25 secondary schools selected from three districts (Darjeeling, Hooghly and Siliguri) of West Bengal, India randomly. Self developed and validated questionnaire consisting of 40 items based on availability of equipments, softwares, training of teachers and use of educational applications etc were used as tool for collecting data from school principals. The data were analyzed in terms of frequency count, percentage and average followed by qualitative descriptions. The study indicated that all secondary schools have desktop and projectors in smart classroom but 88% of schools do not have laptop and no schools have interactive board which is important for smart classroom. Half of the teachers are trained in using smart class and ICT for taking class and few schools have subject specific educational softwares. Majority of teachers does not use smart classroom every day for teaching learning. The study suggested that all schools must be equippied with proper digital devices and subject specific softwares. Teachers must be oriented or trained in smart class pedagogy for taking class as it fosters students cognitive capacities. Further, teachers must be encouraged and motivated by educational authority and school principal for using smart classroom facilities in regular teaching activities.

Keywords: ICT, Smart Classroom, Educational Softwares, KYAN, NROER, SWAYAM.

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Vocational Knowledge of Students at Secondary Level in Jharkhand

Abstract

The objective of this paper is to study the level of vocational knowledge of students and compare the vocational knowledge of students in relation to sex, types of school and parents profession. Survey method was used on 200 secondary school students selected from four secondary schools (two CBSE and two state board) of Dhanbad district of Jharkhand, India randomly. Self-developed test on vocational knowledge consisting of 40 items based on different careers was used as tool for the collection of data. Collected data were analysed by using frequency count and percentage and presented in tabular and graph form. The study reveals that (i) 60% of secondary school students have average, 30% of students have low and

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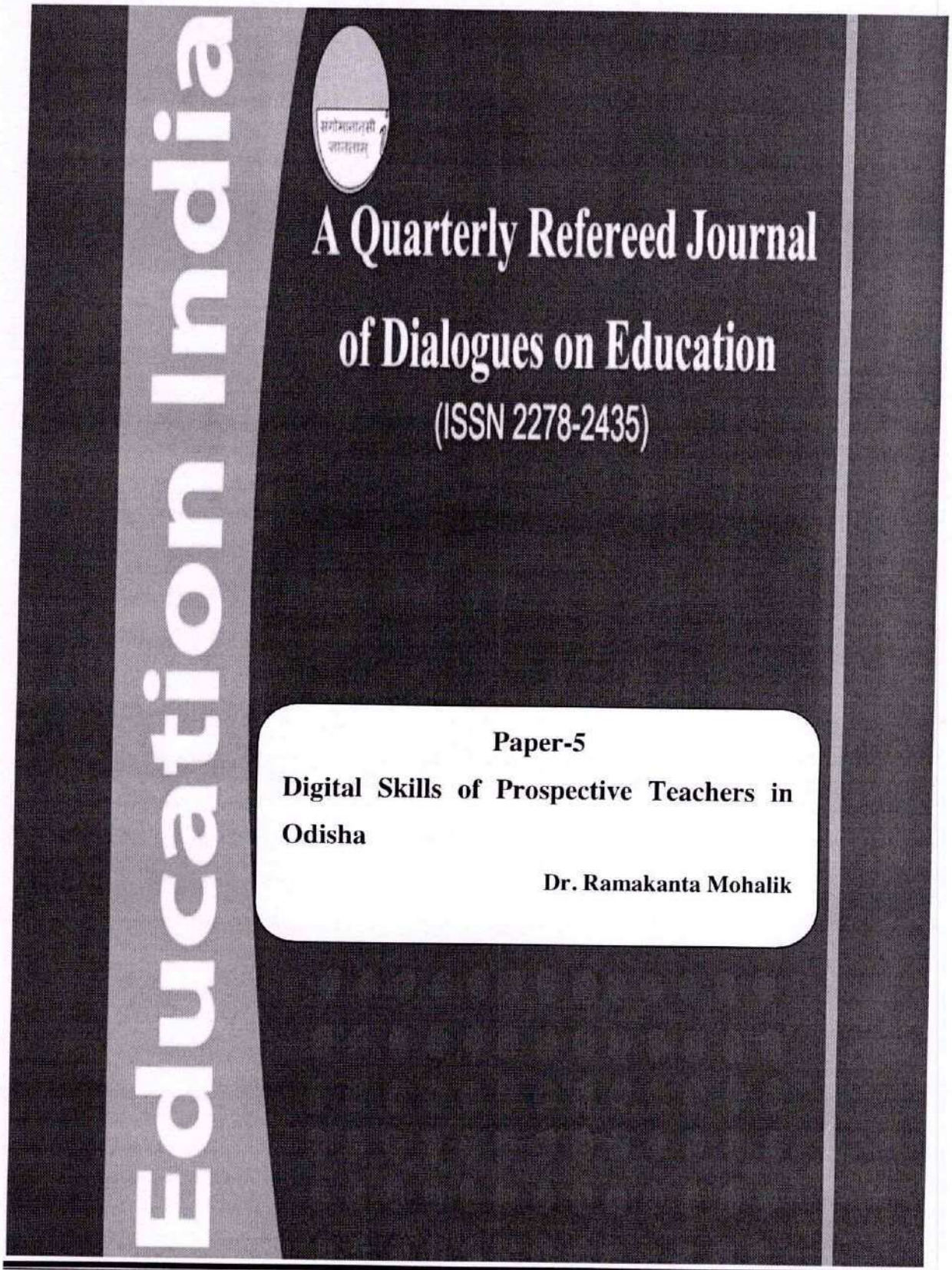

Digital Skills of Prospective Teachers in Odisha

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Abstract

Digital devices and applications have been used in schools and teacher education institutes across the globe for teaching learning. All the prospective teachers must be digitally savvy to utilize it in school for teaching, assessment, management and professional development. This study intended to find out the level of digital skills and its uses among prospective teachers at secondary level. Survey was conducted on sample of 170 trainees selected randomly from teacher education institutes under Utkal University, Odisha, India. Self developed questionnaire based on different aspects of digital devices and applications such as skills of trainees in digital technology, use of digital technology and applications by trainees for learning and teaching etc. was used at tool. Collected data were subjected to frequency and percentage analysis and accordingly conclusions were drawn. The study found that (i) majority of trainees can change screen brightness and contrast, minimize, maximize and move window screen, use search command to locate a file and download and install applications, (ii) more than 50% of trainees do not know learning management system, virtual worlds, podcasts and web design applications, (iii) around 70% of trainees are aware about storage of video in camera, manage junk mail and update username and password and less than 50% of trainees knew about voice typing and cyber security, (iv) majority of trainees use group email and whatsapp for academic work and only 20% of trainees use digital devices for using PPT in class, create digital learning materials, provide feedback to students. It is suggested that teacher education institutes must be equipped with digital devices and applications useful for teaching learning and professional development. Further, teacher educator must encourage and motivate trainees by integrated ICT in regular course work and across the subjects so that trainees can develop skills of using it for teaching, learning and assessment in schools.

Key Words: *Digital Literacy, Digital Devices, Applications, Teacher Trainees, and ICT.*

Conceptualization of the Problem

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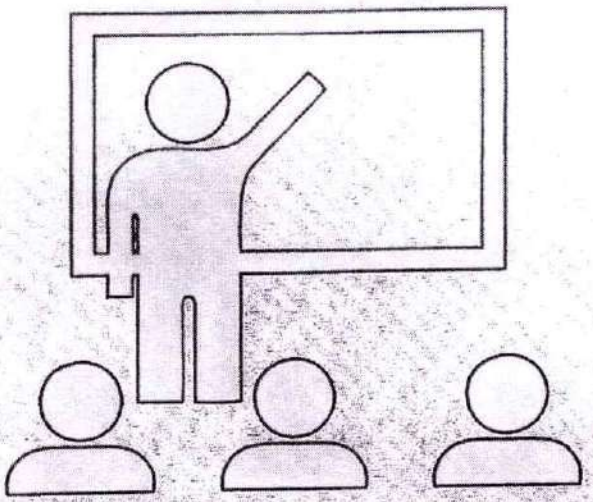

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Engaging with Learning Organization Theory: Development and Challenges

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Introduction

In the recent development in Management theory administrative discourses 'Learning organization' has been termed as a buzzword. Learning organization is the term given to an organization which facilitates the learning of its employees so that the organization can continuously transforms itself. Learning organization develops as a result of the pressures which are being faced by the organizations these days for enabling them to remain competitive in the present day business environment. Different approaches have been developed in the administrative theory for orienting the organizational behaviour towards the success of the enterprise. But within this 'learning organization' was created a paradigm shift in engaging with the members of any organization in more value based approach. The learning organization concept was coined through the work and research of the team lead by Peter Michael Senge who is an American systems scientist at the MIT Sloan School of Management. As a concept 'Learning Organization" encourages to a more interconnected way of thinking. Such organization becomes more like a community for which employees feel a commitment to. Employees work harder for the organization since they are committed to it. At this realm we can see the relevance of the learning organization theory which become overwhelmingly important, where the information technologies and allied knowledge organizations are expanding

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Educational Status of the Mankirdia Tribe in Kaptipada Block of Mayurbhanj: An Analysis

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Abstract

Mankirdia tribe is one these tribe who live semi-nomadic life in the remote wilderness of Similipal National Park and its periphery. They are traditionally skilled in catching monkey and rope making out of the bark of Plant (Siali) Fiber. They wander from place to place in small bands in search of rope making materials and monkey. People call them "Martha or "Mankirdia" i.e. the people who live on monkey catching. In fact they constitute a semi nomadic section of the Birhor tribe. Besides the Similipal forests of Mayurbhanj district, small wandering bands of Mankirdia are also found in neighboring districts of Keonjhar, Sundergarh, Sambalpur, Dhenkanal, Jaipur and Balasore. They speak a language of their own that belongs to the 'Munda' branch of Austro-Asiatic language group. Some of them can also speak the local language Oriya. Though few in numbers, this tribe is successful in retaining its distinct cultural feature as well as identity.This study makes an attempt to put light on the demographic as well as educational status of Mankirdia tribe in Kaptipada block in particularand mayurbhanj district in general. It was found that all the Mankirdia learners are first generation learners and their parents are uninvolved in their study related materials and they are also having very low level of academic/vocational aspiration. It was noticeable that the mankirdia learners have not yet shown a positive attitude towards education in this block.Very few of the Mankirdia learners are regular at school and continuing their schooling for a long time.

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Professional Development of Teachers at Secondary Level

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Abstract

The objectives of the study were: to study the professional development activities undertaken by teachers at the secondary level and to analyze the self-reflective practices of teachers towards professional development at secondary level. The present study was conducted on 10 secondary school teachers of Narayangarh Block, Paschim Medinipur, West Bengal by using descriptive survey method. The researchers had used questionnaire and interview schedule for teachers to collect data for the study. It is found that 50% teachers of sampled school have participated in professional development related activities like attending courses/workshops, education conferences/seminars etc. during the last 5 years and 30% teachers have participated in individual or collaborative research, case study/action research, publication in journal, review of research papers during the last 5 years. It indicates the moderately impact on their professional development as a teacher. Since the majority of the teachers have not participated in professional development related activities, it is suggested to organize orientation programme for the teachers to encourage in participation of professional development related activities.

Keywords: Professional Development, Reflective Practices, Teachers, Secondary Level.

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