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VETRI EDUCATION

Volume 9 **Number 1** **January – March, 2014**

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Editor's Note

Dear Readers,

Please accept Hearty Greetings and Best Wishes for a Very Happy, Prosperous and Productive New Year. Let 2014 be more productive, educative and informative for **Vetri Education** and its readers. We will arduously maintain the quality, format and the timely publication of **Vetri Education** with your support. You are viewing the First issue of the 9th volume of the Journal before the middle of January, 2014.

The first article in this issue: *A Critical Analysis of Models of Distance Learning and Associated Delivery Technologies* by **Gyanendra Kumar Rout** describes in detail different models of distance learning and the technologies associated with them for effective delivery, along with merits and demerits of each one.

Fouziya Qadiri in the second article of the issue: *Influence of Pre-school Education Quality Indicators on Children's Cognitive and Language Development* explains the nature and measure of the quality of experience and learning of children, necessary for their high centred quality development, exhibiting more independent and less anti-social behaviour.

Knowledge Management in Libraries by **N. Jeenath,** forming the third article tries to educate library users a lot of services and special tasks students, researchers and any knowledge seeker can avail from a good library and a co-operative library staff.

The fourth article: *Strategies for Successful Language Acquisition* by **Omana Antony** details in a simple, catchy and effective manner how competency in the universal language – English – can be achieved by students and other language learners in an interesting and joyful manner.

Explaining the "Concept, Skill, Process, Attitude and Metacognition (CSPAM) mathematics strategies", a technique called the "bar model", **K. Thiyagu** advocates its introduction in Maths learning of children through his article: *Effectiveness of CSPAM Strategies in Learning Mathematics by fourth Standard Students* (Article 5, in this issue), based on his research study.

The sixth and last article: *Barriers in Quality Teacher Education Programme in Tamil Nadu* by **K. Arunkumar** and **S. Kuttiammal** surveys the existing mostly unsatisfactory infrastructural and academic facilities of teacher education institutions in Tamil Nadu and offers suggestion for their improvement to produce quality teachers in future.

Vetri Education expresses sincere appreciation and thanks for the valuable contributions and encouragement from authors, subscribers and all our well wishers, and for the earnest services of Mr. P. R. Anebarassane Rada and Mr. N. R. Prabu for their inputs for the successful and timely publication of the issues of the Journal.

Academic Editor,
Vetri Education

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A Critical Analysis of Models of Distance Learning and Associated Delivery Technologies

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Abstract

Distance education got overwhelming response recently as a result of universities introducing many new job oriented courses in the distance-education mode, according to the changing times and students' requirements. The world of technology is getting reshaped by global trends such as convergence, increased bandwidth, enhanced multimedia capabilities, miniaturization, environmental variations, increased mobility, enhanced processing power, more powerful cognitive tools and reduced cost. These trends support transition across four generations in distance education models and associated delivery technologies resulting in the replica of Correspondence model, Multimedia model, Tele-conferencing model and Flexible learning model for students of new generation.

Key words: Distance learning, delivery technology, paradigm shift

Introduction

The emergence of modern multi-media distance education in the last decade of the 21st century had several causes. Governments wanted to expand access to higher education. They assumed this would require the use of new technologies and methods, because an essential aim was for students to learn wherever they were, without having to assemble in classrooms. Teaching and learning would occur at distant centres, away from physical reach.

There has been a significant expansion in the availability of a wide range of technologies with the potential to improve the quality of teaching and learning in higher education. Apart from the more traditional technologies, the new technologies provide opportunities for enhancing the quality of teaching. Presently these technologies have been supplemented by the advent of opportunities for interactivity and access to instructional resources provided by the computer communication networks popularly referred to as the "Internet" or the "Information Super Highway". By and large, distance educators have embraced these new technologies, while the application of such technologies to conventional on-campus education has been primarily piecemeal and rather limited (Sharma, 2007).

While distance educators have striven to overcome the perceived shortcomings associated with limited opportunities for face to face teaching and basically satisfied with conventional approaches and therefore tending to ignore the new technologies of teaching and to concentrate their energies on research and other forms of scholarly activities.

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While some hold the view that much face to face teaching is both uninspired and uninspiring, others are equally adamant that it is a well-tried and tolerably effective system. Nevertheless, it seems reasonable to suggest that qualitative improvements in teaching and learning in higher education are both possible and desirable. Further, given the massive impact of technological innovation in most fields of human activity over the years, it is likely that the judicious application of new technologies to education and training could significantly improve the efficacy of the teaching-learning process in higher education. Since many distance education providers have been in such initiatives, a review of developments in the application of new technologies in the distance education context could be a fruitful starting point for evaluating alternative modes of delivery, which might serve to enhance the quality of teaching and learning in all higher education institutions (Dron, 2012).

Discussion

Role of ODL system

There is a remote possibility of attaining the targeted 15% GER in higher education by the end of the Eleventh Five Year Plan and 30% by 2020 through the conventional Universities – Central, State, Deemed and Private – and other educational institutions including private players. This is mainly due to the fact that limited seats and high costs particularly imposed by private players, constraining the access of a large segment of the population aspiring for higher education. This Herculean task of attaining the targeted GER can be made possible through open, flexible and less expensive mode of education, i.e., the open and distance learning (ODL) system. The National Knowledge Commission (NKC) also played a pivotal role to ODL system to build up the knowledge society in the 21st century. The provision of relevant and quality education to all citizens can be provided preferably at their doorsteps by ODL system through its flexible, cost-effective and learner friendly modes using information and communication technology (ICT). ICT enabled linkages through broadband and satellite network in the ODL system bring out teaching-learning process to **"3As" scenario - Anyone, Anytime, Anywhere - making "Education Beyond Barriers"**. The NKC in its report categorically states ***"Open and distance education (ODE), enabled and delivered through information and communication technology (ICT) holds the promise to address the questions of access, and provide new, alternative forms of capacity building"*** (NKC, 2009). Considering the wide scope of ODL system to provide flexible access to higher education – general, professional and vocational - the governments, both Centre and State, are giving due emphasis on horizontal and vertical expansion of quality education through open and distance mode since 1980s (Pannerselvam, 2009). This has resulted in the establishment of 13 State Open Universities, one national Open University (IGNOU) and about 200 Directorates of Distance Education of the dual mode conventional Universities. In fact, ODL accounts for about 30% of the total enrolment in the segment of higher education, and thereby contributing substantially towards raising GER.

A Learner centric approach to education

- Students can learn at any time (before, during or after normal school hours, at the desktop in the workplace, "just in time learning" for a particular task)
- Students can learn at any place (in the traditional classroom, in a dorm room, at home, at a convenient learning centre, at work, on the road)
- Students can learn at their own pace, giving extra time to new material and speeding through material already known, with pauses for tutorial help or supplemental courses.

- Students can learn more efficiently when concepts are presented in multiple media; they can select the mode, more suitable for their self understanding and retention
- Students can learn only what they need to know, reinforcing both retention and motivation learning and applying individual modules of a course
- The course content and course quality are constant; organizations can document training coverage and student learning over a wide geographical or temporal area
- The need for costly, permanent teaching facilities is reduced; learning can take place at home, in dorms and workplaces, or in temporary facilities

Paradigm shift

The Correspondence model

The original form of distance learning was correspondence courses, in which print materials were mailed to students and returned to the teachers through the postal system. Even though there are numerous new options for distance learning, print remains a significant component of most courses. Print materials may serve as the primary source of instruction, or they may be supplemental. As a primary source, distance students might use a textbook and read various units on a specific time table. As a supplement to instruction, text materials may take the form of worksheets or study guides that are used in conjunction with video or voice technologies. It is important to note that the supplemental print materials may be disseminated via regular mail (Bull and Kay, 2010). There are many advantages and disadvantages of incorporating print materials.

Advantages of print materials

- Extremely portable. Print materials can be used in any location
- High comfort level. Most students are very comfortable using print materials to learn
- Cost effective. Print materials can be created and duplicated with little expense
- Readily available. Many distance learning courses can take advantage of existing textbooks, thus saving the time and expense of creating custom materials

Disadvantages of print materials

- No interactions. Print materials do not generally provide built-in interactions. Additional technologies, such as e-mail, must be supplemented
- No audio/visual elements. Print materials are static and are not appropriate for teaching languages and visual concepts
- Require reading skills. If the learners are non-readers or requiring language skills, print materials will not be effective
- Time delay. It may take days or weeks for printed matter to travel between student and teacher

The audio-visual model / multimedia model

There is a technological shift from correspondence media to audio / video technologies in distance education. It includes Radio, TV, Audiotape, Videotape.

Advantages of audio-visual technologies

- Allow both audio and video communications. Video technologies can provide the visual and audio realism of a face-to-face class. It is generally considered the "Next the best thing to being there"
- Facilitate personal feelings. Video technologies enable students and instructors to see facial expressions and body language, adding personalities to communication
- Enable high levels of interaction. Most video communications are synchronous, allowing high degrees of interactions, questions and answers, etc.

Disadvantages of audio-visual technologies

- May be expensive. Cameras and editing equipment can be expensive. In addition, the infrastructure at each site and the links between sites can be costly. For example, in Florida the rate is $400 per hour for satellite time
- Require a great deal of planning and preparation. To be effective, the camera crews and the instructor must practice and become a team. Faculty members generally need practice and training to be effective in this domain
- Must be scheduled. Most videoconferences are not spontaneous. Instead, they must be planned and the necessary resources must be scheduled
- Require technical support team. Because of the complexity of video recording, mixing, and transmission, a technical support team is required. In addition, site facilitators are necessary to ensure the functioning of the equipment

The Tele-learning model

The delivery technologies are Audio tele-conferencing, Video-conferencing and Audio graphic communication.

Audio Teleconferencing

Audio Tele-conferencing is most commonly associated with use of the telephone to conduct an interaction. This type of interaction usually takes place with the use of speakerphones and a phone bridge that both the educator and the learners can dial into.

Advantages

- Most common; everyone knows how to use a telephone
- Telephone technology is widely accessible to most parts of the world
- There is little concern about compatibility with other phone systems
- The cost to conduct a tele-conference is relatively inexpensive
- Learners and educators, separated by distance, can communicate in real time
- Allows guest presenters who are unable to attend in person, to interact with students

Disadvantages

- The learners must be sent handouts ahead of time; last minute additions to the learning packets are difficult to make
- Learners might feel a bit reluctant to ask questions
- Learners might lose interest if not constantly required to engage with the learning packet
- Long term courses can result in high communication costs
- There can be some audio problems when connecting a phone to a sound system

Videoconferencing

Videoconferencing is interactive two-way visual and audio communication over a distance. It is often referred to as "videoconferencing" or "video tele-conferencing", both of which mean the same thing. It is one of many technologies within the domain of "video communications" including broadcast television, video streaming, video assessment and video collaboration (Goa and Sun, 2010).

Advantages

- Allows both audio and video communications. Video technologies can provide the visual and audio realism of a face-to-face class. It is generally considered the "next best thing to being there"
- Facilitates personal feelings. Video technologies enable students and instructors to see facial expressions and body language, adding personalities to communication
- Enables high levels of interaction. Most video communications are synchronous, allowing high degrees of interactions, questions and answers, etc.

Disadvantages

- More expensive. Cameras and editing equipment can be expensive. Besides, the infrastructure at each site and the links between sites can be costly. For example, in Florida the rate is $400 per hour for satellite time
- Require a great deal of planning and preparation. To be effective, the camera crews and the instructor must practice and become a team. Faculty members generally need practice and training to be effective in this domain

- Must be scheduled. Most videoconferences are not spontaneous. Instead, they must be planned and the necessary resources must be scheduled
- Require technical support team. Because of the complexity of video recording, mixing, and transmission, a technical support team is required

The flexible learning model / virtual classroom model / intelligent flexible learning model

The delivery technologies are Interactive multimedia, Computer mediated communication (CMC) and Internet-based access to WWW resources.

Interactive multimedia

Interactive Multimedia focuses on designing digital environments in which users can create content, not just navigate through content. This leads to a unique feeling of engagement and empowerment. Rules are set to define the environment, interface is provided for interaction and the state of the content is often shared and stored.

Computer mediated communication (CMC)

CMC is one of the newest technologies to be adopted for distance teaching. Using this medium, students and an instructor who might otherwise meet only at class time use their personal computers, communication software, and modems to connect to a central host computer that runs the CMC software. They have twenty-four hour access to the host computer, and can dial in (log on) to receive messages or leave messages at any time. The CMC describes the ways we humans use computer systems and networks to transfer, store, and retrieve information, but our emphasis is always on communication. In our model, the computer network is primarily a mediator for communication rather than a processor of information. As it is currently used to support instructional purposes, CMC provides electronic mail and real-time chat capabilities, delivers instruction and facilitates student-to-student and student-to-teacher interactions across a desk or across the world. These utilities are enabling and promoting several paradigmatic shifts in teaching and learning, including the shift from instructor-centred distance education to student-centred distance learning (Dron, 2012).

Internet-based access to WWW resources

In the Virtual Classroom Model, the instructor and students do not meet face-to-face, and the course is conducted asynchronously and online. Although many of the examples of virtual courses with involvement of students at a single location, but participating in a non-traditional way, the virtual classroom concept is ideally suited for a distance education course in which students may participate from anywhere in the world. All of the Web uses found in the Course Supplement Model could be applied. In addition, a virtual course could also include:

- Online lectures and instructional materials
- Interactive multimedia
- Remote access to library resources
- One-to-one communications via e-mail
- Asynchronous group discussions via a listserv or newsgroup
- Synchronous group discussions using chat software
- Experiential learning opportunities
- Online testing and assessment
- Online course evaluation

Critical observation of IGNOU

The Indira Gandhi National Open University (IGNOU) established in 1985 by an Act of Parliament (50 of 1985) has undergone rapid expansion and emerged as an International Institution in the field of Open Distance Learning. The IGNOU's student strength has grown manifold to three million cumulative student enrolments today. The university is providing a cost-effective education to its students and functions through a network comprising the headquarters, regional centres at States / UTs, study centres and partner institutions within the country and in 40 countries overseas. It is now widely accepted as a system leader in the field of ODL the world over. The university is currently offering 430 Certificate, Diploma and Degree programmes through 21 Schools of Studies, 12 Divisions, 14 Centres, and a network of 61 Regional centres, 3, 000 study centres, and 67 partner institutions spread across 40 countries with the help of about 424 teachers and academics and 1, 219 administrative staff. The additional help also sought from about 6, 000 experts from conventional universities and other organizations, and about 39, 000 part-time academic counsellors. The university follows the latest evaluation pattern; provides a multi-media learning system comprising print, audio, video, radio counselling, internet-based learning and face-to-face interactive and through ICT's counselling and practical. The university has a state-of-the-art Electronic Media Production Centre (EMPC) (Tiwari, 2010).

The IGNOU caters to learners from various social sectors mainly in the rural and tribal areas, disability groups, jails and rehabilitation centres, government and non-governmental organizations, parents and home-makers, the employers and the employed. The university has adopted a policy of special focus on rural areas, SCs / STs, inmates, women, blind, minorities, physically handicapped, socially and economically disadvantaged groups, the North-East Regions, Tribal Regions and other most backward districts of the country. For these purposes it has set up 101 special study centres.

Aims

- To democratize higher education by providing access to high quality education
- To provide need based academic programmes with professional and vocational orientation to the courses
- To support higher education as an alternative and effective system
- To upgrade and sharpen skills, refinement of existing knowledge and acquiring of new knowledge through advanced technological support

Major issues

- Lopsided enrolment in various programmes
- Regional imbalance in enrolment
- Lack of innovation in distance education
- Inadequate professional growth of faculties and counsellors
- Technological support to delivery system - more theoretical than practical
- Students remain within the trap of conventional education
- Improper functioning of study centres, considered as the basic structure of the system
- Malpractice in End Term Examination - a poor pointer to the quality of the system

Our Mission

- The flexible learning model has to be emphasized to raise the enrolment in various programmes
- The regional imbalance in enrolment can be solved through effective communication by ensuring the quality of the sender, quality of the message, quality of the media and quality of the receiver
- The faculties of IGNOU, the administrators and the counsellors should have required professional growth
- The study centres attached to different colleges should be immediately withdrawn as most of these colleges fail to ensure the quality of higher education
- A private resource centre / IGNOU resource centre may be established in each district to support the quality of the system
- There should be a placement cell to keep the records of pass-outs from IGNOU and their placement
- The present system of End Term Examination at study centres should be transferred to resource centres. The online examination may be an innovation for students to get their scores instantly

Conclusion

Distance learning modes and technologies have the potential to drastically change the teaching and learning paradigms. New and exciting opportunities abound extending students' access to programs and courses. They also enable colleges and universities to tap new markets, in many cases without heavy investment into bricks and mortar. Distance learning courses expand student access to higher education by helping to overcome barriers of time and location, and may be better than traditional teaching and learning paradigms in helping learners to develop certain kinds of skills. In order for teaching institutions to be successful however, it is important that administrators and faculty alike recognize the skills and mindset needed to engage in distance learning programs. Students and faculty alike will be most satisfied when technologies are deployed, not as an ends in themselves, but as the means to facilitate and support learning and instructional goals - the mission of the teaching institution.

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CURIOUS FACTS, MATERIALS, PROCESSES AND BIO ACTIVITIES

How to copy DNA (Detailed image shows how genomes are copied)

The most well known approach to making the carbon allotrope graphene, which is akin to single grResearchers at Umeå University in Sweden have demonstrated how the DNA polymerase epsilon enzyme builds new genomes. The detailed image they obtained using X-ray crystallography. "The structure of the polymerase that we have solved makes it possible to see where these mutations lead to changes in the structure of DNA polymerase epsilon," explains Erik Johansson." This can help us to understand why a certain mutation contributes to the development of a certain cancer." Specifically, the new research shows how mutations that can contribute to the development of colorectal cancer and cervical cancer lead to changes in the structure of the protein.

Aluminum peel (Citrus fruit inspires a new energy-absorbing metal structure)

Researchers at the Foundry Institute of the RWTH Aachen University in Germany, and Plant Biomechanics Group of the University of Freiburg, Germany, have taken inspiration from the hierarchical structure of the peel of the pomelo fruit (Citrus maxima) and have developed an aluminum hybrid that could be used to optimize technical components and safety materials. The new aluminum hybrid is the product of a bio-inspired approach, combining metals with different mechanical properties that reflect these naturally occurring structures and mimic the strength of the pomelo peel. The composite exhibits a much higher tensile strength (the force needed to break something apart) than pure aluminum, and a much higher ductility (the ability to withstand permanent changes in shape) than the aluminum-silicon alloy.

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Influence of Pre-school Education Quality Indicators on Children's Cognitive and Language Development

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Abstract

The present study was designed assess the influence of pre-school education quality indicators on children's cognitive and language development. The sample comprised 120 pre-school centres drawn equally from ICDS and Non-ICDS by random sampling technique from four selected districts of Kashmir division. Both ICDS and Non-ICDS centres were together rated for their process as well as structural quality. The various dimensions of pre-school education were quantified and graded on the basis of their characteristics on two quality indicators namely: process and structure with the help of ECERS Scale (R) devised by Harms et al. The study revealed that the various dimension of process quality had positive significant correlation with one another; especially the cognitive and language development were highly correlated with the cognitive, language, creative and fine-muscle activities of the sample, time spent on these activities and regular exposure to books. The study found that the engagement of children in multiple developmental activities - planned program, healthier interaction between teacher and pupil and exposure to educational and play material - helped the children to develop higher cognition and verbal abilities. The study further revealed that the structural quality features such as indoor space, classroom environment, play ground, teacher-child ratio and qualification of teachers are linked with the attainment of cognitive and language development of the children. This indicates the strong implication of physical environment and qualification of teachers in the development of young pre-school children. The noteworthy finding is the fact that both process and structural quality indicators influence the cognitive and language development of pre-school children.

Key words: Pre-school children, education, quality indicators, cognitive and language development

Introduction

It is now globally acknowledged that investment in human resource development must accompany investment for economic development of any nation. Considering that human development proceeds along a continuum and that the process of development is essentially cumulative in nature, investment in programs for the youngest group of children in the 0-6 years becomes a major priority as it lays the very foundation for basic education and lifelong learning and development. Research has shown that the most crucial years of learning are the pre-school years when the child's brain is growing and developing. These are the years when nurturing and appropriate stimulation will reap long term benefits as children develop self worth and a host of new skills to serve them for a life time. Early childhood education is all the name implies and more. It comprises all the essential support a young child needs to survive (www.1). The quality of services to children has a profound influence on their development throughout the course of life.

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All children are influenced by the quality of education and care they experience (Sylva, 2003). With high quality environment related to positive developmental outcome, high quality early childhood program renders positive benefits for both short and long terms. The quality of children's services decides the product of the interaction between structure and process. It is commonly accepted that children who attend quality pre-school program are likely to succeed in formal school as compared to those lack the same. Various research reports have noted that investing in high quality pre-school education programme will benefit children and is worth the efforts and cost. The pre-school program is typically rated on two dimensions of quality - process and structure. Process quality is typically measured by observing the experiences in the centre and classrooms and rating the multiple dimension of the program such as teacher child interaction, type of instruction, room environment, study material etc. When the activities and interactions are rated higher, children develop more advanced language and maths abilities as well as social skills. Another study indicates that high quality child care experiences, in terms of both classroom practices and teacher child relationship, enhance children's abilities to take advantage of the educational opportunities in schools. The second way to measure the quality is to review the structural and teacher characteristics of the program, such as teacher-child ratio, class size, qualification and composition of teacher and staff. The structural features of the program are thought to contribute to quality in more indirect ways than process features. Research has consistently found that these sets of indicators, process and structural, are related and influence the quality of the educational experiences of children. When group is small, teacher tends to have a more positive, supportive and simulating interaction with children. Warm and nurturing interaction is directly supportive to children's social competence and future academic success and such interactions are essential for high quality. Children in high-quality ECE settings experience significantly greater cognitive gains than children in low-quality; medium size setting had higher effect than low in the two settings in mathematics, reading/literacy and school performance (NIEER, 2002).

Discussion

Research methodology

The study was carried out to determine the impact of process and structural quality indicators on the acquisition of cognitive and language abilities among pre-school children. The analysis was based on survey method of data collection with the application of Standardized Tests (Garrett, 2005).

Sample and sampling technique

120 pre-school centres were selected by random sampling (Kothari, 2000) from four districts of Kashmir division namely: Srinagar, Budgam, Anantnag and Ganderbal, 60 of which were ICDS centres which are the focal point for delivery of ICDS services and 60 were non-ICDS centres which are commonly referred to as nursery schools. From these early childhood education centres, equal number of pre-school teachers were selected (60 each from ICDS and nursery) in order to elicit in-depth information regarding the nature of pre-school education imparted at these centres.

Research instrument

The various dimensions of pre-school education were quantified and graded on the basis of their characteristics on two quality indicators namely, 'process' and 'structure'. Under these two heads the pre-school education imparted to the young children were analysed and later these indicators were separately correlated with the scores obtained by the children on standardised test used to measure their cognitive and language development. All the components of pre-school education covered under process and structure indicators were scored on a seven point scale ranging from 1(inadequate) to 7(excellent) based on ECERS(R) devised by Harms *et al.* (2005) and designed especially to assess quality of early childhood education imparted at various centres. Both ICDS as well as non-ICDS centres were together rated for their process as well as structural quality.

Results and analysis

The relationship of process quality indicators with cognitive and language development of children is analysed and discussed under the following heads:

- *Developmental activities*
- *Interaction between teacher and pupil*
- *Play material*
- *Teaching material*
- *Duration of academics*
- *Duration of activities*
- *Books*
- *Program plan*

The relationship of structural quality indicator with cognitive and language development of children is analyzed under:

- Indoor space
- Qualification of teacher
- Training of teacher
- Teacher child ratio
- Playground

Relationship of variable items along with aggregates of cognitive and language abilities are tabulated together in Table 1 for convenience of analysis, discussion and drawing proper inferences.

Table1: Relationship of process quality with children's cognitive and language development

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Cognitive activities	1.00												
2. Language activities	0.279*	1.00											
3. Fine- Muscle activities	0.722**	0.087	1.00										
4. Creative activities	0.540**	0.213*	0.732**	1.00									
5. Interaction b/w teacher & child	0.284*	0.027	0.498**	0.480**	1.00								
6. Play Material	0.608**	0.151*	0.689**	0.481**	0.407*	1.00							
7. Teaching Material	0.268*	0.091	0.205*	0.117	0.071	0.467*	1.00						
8. Duration of Acd	0.335*	0.050	0.638**	0.566**	0.426*	0.573**	0.864**	1.00					
9. Duration of dev act	0.500**	0.114*	0.576**	0.364*	0.335*	0.587**	0.331*	0.308*	1.00				
10. Books	0.592**	0.127	0.815**	0.531**	0.482**	0.687**	0.292*	0.626**	0.655**	1.00			
11. Program Plan	0.463*	0.014	0.612*	0.500**	0.478*	0.554**	0.215*	0.432*	0.589**	0.632**	1.00		
12. Aggregate cog abilitiest	0.461*	0.662**	0.576**	0.471**	0.394*	0.465*	0.354*	0.378*	0.613**	0.669**	0.411*	1.00	
13. Aggregate lang abilities	0.498**	0.593**	0.605**	0.486**	0.487*	0.483**	0.386*	0.419*	0.598**	0.681**	0.476*	0.886**	1.00

** $p < 0.01$. * $p < 0.05$

Relationship of process quality with children's cognitive and language development

Information on the relationship of the children's development in dimensions of cognition and language with the pre-school education received by them in terms of its process indicators are detailed section wise:

Process quality: Process component emphasizes the actual experience that occurs in an educational setting which may be indicated by factors such as teacher-child interaction, use of teaching aids/material, engagement of children in activities and program structure. The dimensions of pre-school education which are quantified for assessing the process quality for the present study are:

a. *Developmental activities:* These are activities which foster the development of children in areas such as cognition, language, fine-muscle development and creativity. The activities include sorting, seriation, blocks, puzzles, object talk, clay modelling, drawing, naming, identification of pictures, etc.

b. *Interaction:* The interaction between teacher and children was graded on the basis of frequency and opportunity of direct interaction between them through activities such as group play, singing songs, free conversation and storytelling.

1. *Play material*: This component was graded in terms of availability and suitability of play material in classroom for the children
2. *Teaching material:* Grading was done on the basis of availability and use of teaching aids in the classroom setting
3. *Time allocated to academics:* This variable was graded in terms of time spent on pre-literacy learning at the pre-school centres
4. *Time allocated to developmental activities*: Grading was carried out in terms of overall time spent on different activities at the early childhood education centres

a. *Book:* This dimension was graded in terms of availability, and usage of age and content suited books at pre-school centres

b. *Program plan:* Grading was done on the basis of formulation and nature of program plan used at pre-school centres

The correlation matrix depicts the relationship between process components and the cognitive and language development of the preschool children.

The information on the relationship of the children's cognitive and language development with process indicators of pre-school education received by them are described section wise:

Developmental activities

Four types of developmental activities - cognitive, language, fine-muscle and creative activities - carried out at ICDS and non-ICDS centres for the children are correlated with the scores obtained by the children on the standardised cognitive and language scales. Results reveal that all the four types of developmental activities share positive and significant correlation with both the developmental areas.

Highly significant correlation was noted between language activities and language development ($r=0.59$, $p < 0.01$) and also between language activities and children's cognitive development ($r=0.66$, $p < 0.01$). Fine-muscle and creative activities were also significantly correlated with both language and cognitive development of the children.

From the computed values of correlation it is clearly evident that the various developmental activities carried out at pre-school centres have implication for young children's cognitive and language development. Probably, more the pre-schoolers engage in developmental activities higher was their cognitive and language development; or it can be interpreted that children with higher cognitive and language development tend to engage more in such activities.

Hence, all pre-school centres need to focus on conducting multiple developmental activities at frequent intervals to assist in the growing children's cognitive and language development.

Interaction between teacher and children

Interaction between teacher and children was found to share positive and significant correlation with the children's language ($r=0.48$, $p < 0.01$) as well as cognitive ($r=0.39$, $p < 0.05$) development. This indicates that healthy interaction and engagement of children in interactive activities which included, free conversation, group play, singing songs, etc. help to ensure better cognitive and language abilities among pre-schoolers. It was also observed that with a loving and affectionate teacher, children were much more relaxed and comfortable. Children at various centres were noted to be more social and exhibiting higher verbal ability when their teacher provided more stimulation in terms of activities and possessed caring and encouraging behaviour towards them.

Play material

Play material was also found to share positive and significant correlation with the score obtained by the children both on language ($r=0.48$, $p < 0.01$) and cognitive ($r=0.46$, $p < 0.05$) development index. It indicates that when children play and experiment with age suited toys it helps to foster their cognitive and language skills. It was found when children had the toys available and could experiment with age suited and multipurpose play material in classroom, it helped to meet their various developmental needs. Children were found to show interest and curiosity towards the play material available around them. In some of the observed ICDS centres with very few play material available, children found ways to play and explore to satisfy their inner curiosity to the extent possible. In view of these findings, there is an urgent need to provide enormous opportunities for the young children to experiment with new and indigenous play material at the pre-school centre

Teaching material

There is a positive and significant correlation of teaching aids/material used at pre-school centres for imparting early childhood education with the cognitive ($r=0.35$, $p < 0.05$) and language ($r=0.38$, $p < 0.05$) abilities of the children, showing that cognitive and language abilities get more advanced when children use, experience and have the availability of various learning gadgets in classroom. It is noted that teaching aids and equipments also attract the young children just like play material. When teachers use these materials for teaching them, children become more attentive and interested.

Duration of academics

Like other process indicators, there is positive correlation between time allocated to academics with language ($r=0.41$, $p < 0.05$) and cognitive ($r=0.37$, $p < 0.05$) development of pre-schoolers. It means when children devoted more time to learn pre-literacy skills, it helped to foster higher cognition and language development and vice-versa. Probably, the children, being young and in the initial stage of grasping and acquiring academic skills, need to devote more time for achieving it. These results have implications for curriculum planning, as it indicates the necessity of allocation of adequate time so that the children can learn various concepts and thus, improve their language and cognitive skills.

Duration of developmental activities

Highly significant correlation was also found between duration of developmental activities with the scores obtained by the children on cognitive ($r=0.61$, $p<0.01$) and language ($r=0.59$, $p<0.01$) scales. This implies that when children devote ample time on developmental activities, higher is their cognitive and language development. Probably, engagement with different developmental activities stimulates the children's minds and thoughts; gives children new ideas and concepts and helps to increase their concentration and attention span. It is thus important to plan different types of developmental activities for young pre-school children, dedicating ample time for these activities also.

Books

There is positive significant correlation of books with language ($r=0.68$, $p \leq 0.01$) and cognitive ($r=0.66$, $p \leq 0.01$) abilities of pre-school children. This indicates that longer the children experience and use different concepts of books in classroom, higher are their cognitive and verbal ability. Conversely, it can be deduced that children with higher cognitive and language abilities tend to explore books more and develop learning skills. It is noted that children with adequate exposure to age suited and differently themed books, show greater curiosity to learn and become captivated by them.

Program plan

Like elsewhere, here also there is a positive significant correlation of program plan with the language ($r=0.47$, $p < 0.05$) and cognitive ($r=0.41$, $p < 0.05$) development of sample children. The results highlight the importance of having a planned program at pre-school centres and further show that when preschool environment is designed according to children's interest and needs, it contributes towards their developing language and cognitive skills.

Relationship between cognitive and language development

Highly significant positive correlation is also found between the aggregate cognitive and language abilities of the sample preschoolers ($r=0.88$, $p < 0.01$), implying that children with higher cognition demonstrate more advanced language abilities and vice-versa. Other researchers also observe that children with higher gains in language are cognitively more advanced. Such children are socially more communicative, experiment oriented, more exploring, more curious to learn new skills and concepts and more attentive.

Relationship of structural quality with children's cognitive and language development

Structural Quality: The other aspects of pre-school education, imparted at various centres were evaluated in terms of 'structural quality' which focussed on teacher characteristics of the program, such as teacher-child ratio, qualification and training of teacher along with other infrastructural components such as classroom environment and indoor space.

a) Indoor space: This dimension was graded on the basis of spaciousness and use of classroom space

b) Classroom environment: The classroom environment was graded on the following essential parameters as:

1. Cleanliness
2. Ventilation
3. Lighting
4. Coloured walls
5. Display of charts and posters

c) Play ground: Grading was carried out in terms of area, maintenance and use of play area

d) Teacher-child ratio: This dimension was graded in terms of availability of teacher and number of children accommodated in each classroom

e) Qualification of teaching staff: This component was graded on the basis of educational qualification of pre-school teacher

f) Training of teaching staff: Grading of this dimension was carried out on the basis of nature of training received by pre-school teachers consonant with their job requirement

The following are the results of the correlation computed to assess the relation of the structural indicators with the children's cognitive and language development:

Indoor space

There was a significant positive correlation between space available in the classroom and the scores obtained by the children on the test used to assess their cognitive ($r=0.19$, $p < 0.05$) and language development ($r=0.23$, $p < 0.05$). The results show that children getting adequate space within the classroom, to engage in different activities, help to promote better cognitive and language development among them. Probably, space affords greater freedom to the children making them more mobile and physically comfortable. Usually, it is noted that children use the indoor space to get involved in various activities such as group play, puzzle solving, building blocks, drawing and engagement in self selected activities, etc. When the space is not adequate and seems unsafe and congested children's activities are also limited and restrained.

Classroom environment

Classroom environment also shared a positive significant correlation with both languages ($r=0.56$, $p \leq 0.05$) and cognitive ($r=0.54$, $p \leq 0.05$) development of pre-school children. This implies that classroom environment probably supports the cognitive and language development of children. Children receiving education in stimulating and congenial classroom environment are found to enjoy learning. It is also observed that preschool centres providing clean and quality classroom environment to children along with walls, beautifully designed with appropriate themes and posters, facilitate interest among young children to become active learners.

Play ground

Highly significant correlation was found between the playground facility and scores obtained by the children on language ($r=0.52$, $p\leq0.01$) and cognitive ($r=0.53$, $p\leq0.01$) scales. This indicates that probably availability of adequate playground facility provided abundant opportunities to children to engage in different outdoor activities, helping them to develop higher cognitive and language abilities among them. The observation: 'more the planning of the play ground of pre-school centres, higher is the involvement of its children in various outdoor play activities', points to the beneficial effect of children utilising their bodies and minds more effectively.

Teacher-child ratio

A positive and significant correlation between teacher-child ratio and the cognitive ($r=0.14$, $p< 0.05$) and language ($r=0.18$, $p<0.05$) development of the children was observed. This indicates that adequate teacher-child ratio in classroom promotes closer relationship, individual attention and healthier interaction among teacher and pre-schoolers, helping them to ensure better cognition and language development. The fact, observed earlier under the process quality, that there is significant influence of the teacher-child interaction on the children's development is further reinforced here, revealing the importance of both the number of teachers and their interaction with the children for their growth and development.

Qualification of teacher

Highly positive significant correlation was also found between qualification of teacher and the language ($r=0.57$, $p \leq 0.01$) and cognitive ($r=0.55$, $p \leq 0.01$) development of pre-schoolers. The results show that probably the more qualified a teacher, the more she/he is skilled to handle the children and thus, influence their cognitive and language development. It is also noted that usually more qualified teachers are also more experienced and hence can manage the kids better. It was observed that teacher who had higher qualification provide nurturing environment and are more creative in planning daily activities and lessons, ensuring better cognitive and language development among children.

Training

Training of the teacher was the only structural dimension, not sharing positive correlation with the language and cognitive development of the pre-schoolers. This probably reflects that the training received by the pre-school teachers of this study was insufficient or ineffective during the course of their education and thus, not significantly correlating with the children's development.

Conclusion

The early years of child's life provide the foundation for future development and achievement (www. 2012). The quality of experience in those early years is critical to enable children to fulfil their lifelong potential. Quality makes a difference to children's development and in high quality centred children show more independence and reduced anti-social behaviour by the time they enter primary school. High quality early childhood programs benefit children academically and socially leading to adulthood and experiences. Both classroom practices and healthy teacher-child relationship enhance children's abilities to take advantage of the educational opportunities in school. Thus, it is clear that investing in high quality preschool education benefits children and is worth the cost (NIEER, 2002).

The present study indicates that process quality of preschool education positively influences the cognitive and language development of preschoolers. The various dimension of process quality also show positive significant correlation with one another and especially the cognitive and language development of children are highly correlated with the cognitive, language, creative and fine-muscle activities, time spent on these activities by the children and regular exposure to books. It is evident from the results that the engagement of children in multiple developmental activities, planned program, healthier interaction between teacher and pupil and exposure to educational and play material help the children to develop higher cognition and verbal abilities. Similar findings are recorded (NIEER, 2002); when the activities and interaction at preschool are at higher level, children develop more advanced cognitive, language and social skills. Roa (2010) also found that higher quality of pre-school education is associated with better overall development of the children.

The findings corroborates that the structural quality features such as indoor space, classroom environment, play ground, teacher-child ratio and qualification of teacher are linked with the attainment of cognitive and language development of the children. It points to the importance of the implication of physical environment and qualification of teacher in the development of young preschool children. These results reaffirm the findings of Todd (2001) that children develop better vocabularies, more advanced attention, memory skills and get along better with peers, when preschool environment are more stimulating and well organised. Similar observation of correlation was made by MSSRF study (2000) that there existed a positive relationship between the structural quality indicators observed at the preschool centres and the children's performance, especially in cognitive and language competence.

Researches have consistently found that these two indicators - *process* and *structure* - are related, and influence the quality of the educational experiences and development of children (NIEER, 2002). When children receive pre-school education in quality classroom environment, involving stimulating activities, exposure to healthy adult interaction, adequate teacher-child ratio and qualified and trained staff who design appropriate development plan for them, they tend to have better cognitive and verbal abilities to become active participants and develop various abilities. It was also noted by Margaret *et al*. (1996) that structural quality of preschool education indirectly affects the children, whereas process measures of quality directly influence children's overall development.

Therefore, *process* and structural features are essential elements for high quality of childhood program and must be addressed together to achieve excellence in their human resource development.

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Counting molecules? There's an app for that (SlipChip Counts Molecules with Chemistry and a Cell Phone)

Researchers at the California Institute of Technology have demonstrated a method for using a so-called lab-on-a-chip device and a mobile phone to determine the concentration of molecules, such as viral RNA molecules, in a sample. This digital approach can provide accurate quantitative information despite changes in timing, temperature and lighting conditions, a capability not previously possible using traditional instrumentation. The work published in the journal Analytical Chemistry points the way towards digital diagnostics for a wide range of illness and health problems.

Two-faced nanotubes (Tiny 'Lego' blocks build Janus nanotubes with potential for new drugs and water purification)

A Scientists from the University of Warwick, UK and the University of Sydney, Australia, have created "Janus" protein nanotubes – nanotubes with two distinct faces. The Janus nanotubes have a tubular structure formed by the stacking of cyclic peptides resulting in a molecular channel with an internal diameter of 1 nanometer, big enough to allow ions and small molecules to pass through. Each cyclic peptide has two distinct polymer attachments that give rise to a two-faced shell for the nanotubes. In the solid state, these materials could act as molecular sieves for separating mixtures of fluids.

Pencil… (Condom mechanics of graphene)

The saying goes that a tonic can put lead in your pencil, of course pencils contain a graphite-based material, the lead, but now the Bill and Melinda Gates Foundation in its quest for a better condom that more people will use to have safe sex is pumping money into a project that hopes to use another form of carbon, the new "wonder material" graphene, to make super strong and almost nano thin condoms. Aravind Vijayaraghavan and his team from The University of Manchester UK have received a Grand Challenges Explorations grant of $100,000 (£62,123) from the Foundation that will help them develop new composite nano-materials based on graphene. Graphene is the world's thinnest, strongest and most conductive material, and has great potential in electronic, drug delivery, water purification and now safer sex. It was first isolated by Andre Geim and Kostya Novoselov Manchester in 2004 and earned the pair the Nobel Prize for Physics in 2010.

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Knowledge Management in Libraries

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Abstract

Knowledge and Knowledge Management have emerged as important current issues for many organizations. Knowledge management is a completely new concept as well as method of management. It works for converting intellectual assets of workers and staff members in the organization into more productive forces – competition, power and new value. Knowledge management requires linkage of information with information, information with activities and information with man - so as to realize the sharing of knowledge (including tacit and explicit ones). The conventional functions of a library are to collect, process, disseminate, store and utilize documented information to provide service for the society. In the knowledge economy era, the library will become a treasure-house of human knowledge, participate in knowledge innovation and become an important link in the knowledge innovation chain. It can establish partnership for knowledge management, and transform librarians as knowledge professionals, users, and technology experts to contribute to effective knowledge management.

Key words: Knowledge, knowledge management, library, information professionals

Introduction

The present era is one of knowledge and information explosion. The unprecedented growth of knowledge and information has impacted all organizations including the libraries. In the digital environment, the role of libraries is changing to provide competitive advantages for its users. The success of a library and information centre depends on their ability to utilize information knowledge of its staff to serve the user community. The ICT has played a significant role in this dynamics which has not only made access across the globe easier, but has also facilitated integration of thought processes, synergy in working methods and places, team learning and in enhancing organizational transparency. With the development of IT and its applications in libraries, the concept of document management has been changed to information management and again, the entire scenario of information management has started its transformation to knowledge management.

Discussion

Knowledge

Knowledge is an intellectual capital when people, out of recreation, add value to information. Knowledge is classified and modified. Sharing of knowledge is a core element of knowledge management. IT has provided with number of possible solutions for sharing via e-mail, intranet, internet, etc. Davanport (1998), defined knowledge as: "Knowledge is fluid framed experiences, values, contextual information as expert insights that provide a framework for evaluation and incorporation of new experiences of information". It is a "set of tools, techniques, methods, ways of working, even behaviours – that are all designed to help an organization to be more effective" (Collison, 2010).

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Types of knowledge

Knowledge is classified into two types:

1. Explicit knowledge
2. Implicit or Tacit knowledge

Explicit knowledge

Explicit knowledge is one which has been codified or recorded in some format and, therefore, can be shared and distributed through artifacts that can be managed. It is formal and easy to communicate to others. It is the knowledge of rationality. It is also known as declarative knowledge.

Implicit or Tacit knowledge

It is the complex form of knowledge. It has two dimensions namely technical and cognitive. Implicit or tacit knowledge refers to expertise that has been gained through experience, interacting with others, through experimentation or by trial and error. Tacit knowledge resides with individuals only; it is not clearly articulated, codified or documented or disseminated to others. Tacit knowledge is thus the kind of knowledge that typically is not readily available.

Knowledge management

According to Subramanian (2007), knowledge management is generally understood to mean the sharing of knowledge inside or outside of an organization. Knowledge sharing has been greatly facilitated by modern computer based technology. There is no agreed definition of Knowledge management, even among practitioners. The term is used loosely to refer to a broad collection of organizational practices and approaches related to generating, capturing and disseminating know-how and other contents relevant to the organization's business. Knowledge is not just an explicit tangible "thing", like information, but is information combined with experience, context, interpretation and reflection. Knowledge involves the full person, integrating the elements of both thinking and feeling.

Knowledge management is the process of creating, capturing and using knowledge to enhance organizational performance. It is most frequently associated with the activities:

- Documentation and appropriation of individual's knowledge
- Dissemination of it through such venues as a company vide database
- Method of gathering information and making it available to others
- Process of systematically and actively managing and leveraging the stores of knowledge in an organization
- Transformation of information and intellectual assets into enduring values
- System or framework for managing the organizational processes that create, store and distribute knowledge as defined by its collective data

Knowledge management, in the opinion of Deborah *et al.* (2005), is information processed into knowledge which becomes useful and provides utility. This is true both in the realms of explicit and implicit or tacit knowledge. And, is true in almost all aspects of life; effective teaching, learning and research require a combination of explicit and tacit knowledge. This is why the core library function of information management must be refined, enhanced and articulated throughout the library's programs and services (including reference, instruction and research consultation). Emphasis is placed on guiding and assisting students and faculty in the exploitation of information resources to the fullest extent possible in their teaching, learning and research activities. With the continuous explosion of information and knowledge, and the unabated proliferation of their dissemination in a variety of formats, libraries and librarians (especially in universities, active in research) need to bring specialization and expertise to the various aspects of information and knowledge management.

Knowledge management has been conceptualized in a variety of ways. The term is often used to describe a set of processes and strategies which an organization generates, to contribute to its overall success, productivity and effectiveness. Knowledge management has great relevance to higher education. In the academic research library context, it is conceiving scholarly information in ways that make it as accessible and as useful as possible for its academic community in the form, at the time and at the place of their choice or need. This requires not just finding, selecting, organizing and managing scholarly information (functions and roles in which librarians excel), but creating and managing knowledge as well. Viewed from this perspective, knowledge management offers opportunities for expanded roles for librarians and new relationship with information providers and even library consortia. Such a role minimally entails educating the University community about scholarly communication issues. Knowledge management however, also indicates new expectations for our students and faculty as knowledge managers in their own right, and integration of information literacy/fluency and research in appropriate courses at all levels of academic programs. The role of the library in the education and research process is indispensable, as is the "teaching" role (surrogate/actual faculty) of the librarian. In short, the library serves as the scholarly information organizer and potentially as knowledge manager of the institution.

Characteristics of knowledge management in libraries

As a completely new method of management, knowledge management in libraries leaves much to be desired in its theoretical system (Shanhong, 2000); knowledge management in libraries should include such respects as follows:

The role of knowledge management in libraries will become more and more important along with the development of knowledge economy. It is a new management mode, boasts of the following superiority and characteristics incomparable with conventional management.

Human resource management is the core of knowledge management in Libraries

The most important resource in the knowledge economy system is the talents who grasp knowledge. The talent competition has become the focus of market competition in the knowledge economy era. Here, the libraries will attach importance to vocational training and lifelong education of library staff to raise their level of scientific knowledge and ability of acquiring and innovating knowledge. They also are to fully respect the human value, guide and bring into play wisdom potentialities of library staff, take developing knowledge resources in the brains of library staff as an important way for raising work efficiency. An all-round improvement of library staff's quality and prioritization of the human value will become important objectives of knowledge management in libraries.

Knowledge dissemination management

Knowledge dissemination is equally important as knowledge innovation. Knowledge creators do not have much time and energy to look for knowledge users. Though there are a multitude of knowledge users, it is very difficult to acquire knowledge that already exists in the minds of knowledge creators as restricted by various objective and subjective conditions. Therefore, libraries may play the part of knowledge tosser, use diverse media and channels to disseminate various new forms of knowledge. In the 21st century, the internet, with its mass information and extensive contents, will provide seekers with the main approach route to search knowledge and acquire information. But now there is emergence of absurd, salacious, false and uncivilized information resulting from commercialization, profit motive and political objectives on the net. Therefore, it is necessary to strengthen knowledge dissemination management in libraries as follows:

1. Uninterruptedly strengthening the creation of libraries' own document resources and deepening the development of document information resources
2. Continuously raising the quality of library staff and strengthening continuous engineering education of working staff
3. Giving full play to the special role of the expert system in knowledge dissemination

Knowledge application management

In the 21st century, libraries should also attach importance to provision of services for people to acquire knowledge and achieve maximum functions and efficiency of knowledge information. Therefore, knowledge services based on high-speed information networks should be created by:

1. Setting up virtual libraries or information centres for enterprises, governments, public organizations and scientific research institutions. It is difficult for an enterprise or a social organization to put sufficient manpower, material and financial resources on information gathering, organizing and developing. It is also impossible and unnecessary to spend large funds on information resources for their own use. Libraries can create virtual libraries or information centres for these organs separately, according to their respective information requirements by using abundant information resources on the high-speed information networks.

2. Setting up digitized knowledge services which is actually a development trend of libraries in the 21st century. This presupposes creating step by step the users-oriented information service systems such as information dissemination, information search and special supply of information; quickening the creation of digitalized libraries; studying the methods, means and techniques of information distribution and search with the Internet as the base and WEB technique as the core.

3. Digitizing libraries' resources. The electronic libraries or digitalized libraries are the technical modes and development trends of libraries in the knowledge economy era. The knowledge services of libraries in future will start with creation of databases comprising electronic journals and books in different languages that have discipline features and can operate on high-speed information networks. Great efforts should be made to transform all existing large non-electronic information resources into electronic information and integrate them into electronic libraries.

The objective of knowledge management is to promote knowledge innovation

Knowledge innovation is the core of the knowledge economy society. As bases for collection, processing, storage and distribution of knowledge and information, libraries represent an indispensable link in the scientific system chain as well as an important link in the knowledge innovation. Secondly, libraries take part in scientific research process directly. The library work is a component of knowledge innovation. Thirdly, libraries must pay attention to diffusion and conversion of knowledge. They act as bridges for turning the results of knowledge innovation into realistic productive forces. Knowledge management in libraries is to promote relationship in and between libraries, between library and user, to strengthen knowledge internetworking and to quicken knowledge flow. In the knowledge economy era, libraries will carry out researches on development and application of information resources, construction of virtual libraries, protection of intellectual property rights in the electronic era, etc.

Information technology is a tool for knowledge management

Knowledge acquisition is the starting point of knowledge management in libraries. The application of information technologies enlarges the scope of knowledge acquisition, raises speed of knowledge acquisition and reduces its cost. It is impossible to accomplish such important tasks by using human brains only, in the modern world in which the knowledge changes with each passing day. It will be possible to link closely knowledge sources and knowledge workers by computer networks, thus constructing knowledge networks in libraries based on realization of single-point informatization.

The knowledge acquired must be accumulated and converged into knowledge warehouses of libraries. The priority of information technologies in the field of knowledge storage not only finds expression in quantity, but also in retrieval, sorting and security of the knowledge. Information technology is also indispensable in the application and exchange of knowledge and other fields. It functions as a source and tool for knowledge innovation.

Technologies for knowledge management

Library and information centres should be developed/modified, based on the perfect environment for new media applications. Due to impact of globalization, economic competition and revolution of ICT, the libraries are undergoing tremendous change in its structure and environment. ICT tools and techniques, knowledge management systems, internet, web resources, digital libraries - all have made significant changes in the existing library systems and services. It is a major challenge for the library professionals.

Data wise technologies developed the following items for the knowledge management.

- Intranet within an organization
- Document management systems
- Information retrieval systems
- Relational and object databases
- Electronic publishing
- Groupware and work flow systems
- Push technologies
- Help desk applications
- Brain storming applications
- Data warehousing and data mining

The role of knowledge professionals for knowledge management

Knowledge Management has emerged as a key concern of organizations (Kim, 1999). Librarians have long been regarded as part of the support staff of the organization, working quietly in the background, often uninvolved in any of the critical functions of the organization. Information professionals have to recast their roles as knowledge professionals. In other words, librarians need to work as knowledge workers. Knowledge work is characterized by variety and exception rather than routine, and is performed by professional or technical workers with a high level of skill and expertise. Thus, those who exercise their intellects in any of these types of activities are knowledge workers. If librarians' work can be or is totally routine, the work is administrative, not knowledge enhancing. That means, librarian's roles should not be limited to being the custodians or gatekeepers of information. Knowledge professionals will have to move from the background to the centre of the organizational stage, to jointly hold the reins of knowledge management with users and the technology experts, to help steer and shape the knowledge policies, structures, processes, and systems that will nurture organizational learning. Knowledge professionals should be able to extract, filter and disseminate vital external knowledge. They also will design and develop workgroup application suites that are effective platforms for knowledge management. Finally, they will work side by side with users in collecting and analyzing strategic intelligence, and to act as trainers and consultants who transfer gathered knowledge and research skills throughout the organization.

A continuation of the information and knowledge management role of librarians affects the relationship between the instructional faculty and the librarians – a relationship that must become closer than has been practiced in the past. However, in the task force's deliberations it became clearer that this connection needs to be augmented and strengthened. Such an outlook points to librarians as the first knowledge managers for the academic units. This is not necessarily an altogether new role. Librarians indeed have fulfilled and continue to fulfil this institutional role throughout higher education. While that may not be a conception that is seen as much different than practiced today, in future librarians need to bridge the continuum of information management and knowledge management in ways that they will be closely aligned with the faculty in the disciplines, rather than the more prevalent current practice of the more or less "generalist" librarian serving many academic units or programs in some specified capacities.

Preparing the students to be knowledge managers and competent "literature" researchers will require the librarians to be connected to the academic programs more closely, even to the extent of participating in selected courses where the skills of knowledge management are taught to the students and the librarians are working side by side with the faculty member for some portion of the course. In a sense, librarians will become "intellectual partners" in the education of students. They will work to provide students with the best information accessible through libraries in as few steps as possible, to streamline the research process, in order to produce a higher quality product. This involves going directly to the library users, pro-actively seeking them out and asking what their information and knowledge requirements are, rather than passively waiting for them to come to the library (Hamilton, 2012).

The members of the task force can well imagine the library supporting the professional development of the faculty and staff in academic departments through its appropriate research and instructional components. According to (Yaacob, 2010), "Knowledge Management is a challenge to the information professionals and for the fields of librarianship and information science and needs to be taken seriously to leverage the intellectual assets and to facilitate knowledge utilization and creation". Aharony's (2011) findings established that the more the staff trusted the organization and readied to collaborate, the more they developed positive attitude toward *Knowledge Management*.

On line services from Book and Journal Publishers like Wiley Science Solutions, offering help to identify a special group of products that would genuinely assist the scientists' daily research needs and offer excellent value for money, spectral libraries helping to plan a researcher's next synthesis, identify unknown compounds and find experimental protocols, etc. related to science and other areas of study and research are recent inputs for more productive outputs, achievable in less time (Librarian 252, 2013).

Conclusion

This article describes and distinguishes the notion of knowledge and knowledge management and investigates the roles of librarians as knowledge professionals for obtaining organizational goals. Knowledge management has become a powerful tool for promoting innovation and realizing re-engineering the various walks of life. It occupies very significant position in the creation of the knowledge innovation systems of a country. How far the library circles to meet the challenge of knowledge economy and to build the knowledge management systems of libraries is a subject that demands our urgent study and solution. The knowledge professional position will continue to evolve along with the development of the knowledge infrastructure. The precise role of the knowledge professional will depend on the organizational structure and knowledge needs. The emphasis of the role of the knowledge professional is likely to change according to the needs of the user community and the level of technological sophistication.

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Continued from Page 25...

Solvent to superconductor (Researchers create superconductor from solvent)

Chemists in the US have applied pressure to the solvent carbon disulfide and chilled to make it take on metallic characteristics. Choong-Shik Yoo and colleagues at Washington State University have used a diamond anvil cell to apply a pressure of about 5 gigapascals to their sample and cool it to 6.5 Kelvin. They demonstrated that under these conditions, the material adopts a crystalline form in which its electrons are free to move without resistance - they made a novel superconductor, in other words. The research provides new insight into how superconductivity works in unconventional materials, an area that has intrigued scientists for several decades, Yoo said. These unconventional materials are typically made of atoms with lower atomic weights that let them vibrate at higher frequencies, increasing their potential as superconductors at higher temperatures. Although 6.5 K is a lot balmier than the temperatures at which users like to operate devices and instruments that could benefit from superconductors, to say the least.

Hand it to the nanocubes (Tiny Nanocubes Help Scientists Tell Left from Right)

Chirality is a critical issue in pharmacology for well-known reasons that one enantiomer of an asymmetric molecule is often more active than its counterpart and in some cases one enantiomer has serious side effects. A team from Brookhaven National Laboratory and Ohio University have now turned to nanotechnology in the form of gold-and-silver nanocubes to help them distinguish their lefts from their rights. The nanocubes help the team enhance circular dichroism signals. "Our discovery and methods based on this research could be extremely useful for the characterization of biomolecular interactions with drugs, probing protein folding, and in other applications where stereometric properties are important," explains BNL's Oleg Gang.

Greening hydrogenation catalysts (New iron catalyst promises green future for hydrogenation)

Researchers in Canada and Japan have worked together to develop a novel iron catalyst, which they suggest might make hydrogenation reactions more environment friendly. Hydrogenation reactions are commonly catalyzed using palladium or platinum compounds, but these metals are rare and expensive, posing significant economic and environmental problems in obtaining adequate supplies. Iron would make a good substitute as it is abundantly available. But, iron oxidizes. Writing in the journal Green Chemistry, the team from RIKEN and McGill University, have embedded iron-based catalyst nanoparticles in a polymer matrix to protect them from oxygen and water and so preclude their catalyst from rusting. "Our aim is to develop iron-based catalysts not only for hydrogenation but also a variety of organic transformations that can be used in future industrial applications", explains RIKEN researcher Yoichi Yamada.

(Indebted to: Nature, Science, New Scientist, Online Daily Mail, Alchemist News Letter, The Science and Advanced Materials Journal, British J. Nutrition, Discover Newsletter, Agence France-Presse, Journal of Science transactional Medicine The daily telegraph, New Indian Express, Google and BBC)

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Strategies for Successful Language Acquisition

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Abstract

Proficiency in communication in English language is the need of the present era of globalization. Though the Indian students have been exposed to this foreign tongue from the time they are admitted to the pre nursery class, the proficiency in this language remains a distant dream for our students. The intellectual and technical skills of Indian professionals have been approved all over the world; still they miss better opportunities because of their defective communication competency in English, the global language. We have competent English teachers and ambitious students; what we are missing is the appropriate teaching-learning methodology in the English class room. A lot of changes are expected in the attitude and approach towards teaching and learning English language. This paper titled: "Strategies for Successful Language Acquisition" is a cumulative presentation of many a strategy applicable in the English teaching classrooms to facilitate the language acquisition becoming an easy and exciting experience. The strategies discussed here will enable both the teacher and the learner to develop a new attitude and approach towards this colonial language. It is hoped that this paper will definitely enable many a teacher to change their class room methodology in a positive manner to achieve their goal in a more convenient and joyful way.

Key words: language acquisition, strategies, globalization, communication competency, professionalism

Introduction

Strategies for successful language acquisition

Proficiency in English language is the need of the hour for all the aspiring youngsters of India. It is the indispensible criteria for selection in any reputed organization. The one and the only objective of the teachers of English language is to enhance the communication competency of their students. The present educational systems, especially the institutions of higher studies and professional studies, do a lot exclusively to enhance the communication competency of students, utilizing language labs and multimedia facilities. Despite all these advancements, the communication competency in this foreign tongue remains still a distant and difficult dream to be fulfilled. In view of these and with a sincere desire to help the needy and interested, it is felt desirable to suggest some interesting methods and approaches that enable the students to acquire certain proficiency in this language in an easy and comfortable manner.

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Discussion

The method, followed successfully and likely to generate similar effect when practiced by others desirous of improving communication skills, comprises five approaches: 1. Language through literature, 2. Language through discourse method, 3. Language through integrated approach, 4. Technology assisted language acquisition and 5. Live situations in the place of the generally followed less interesting conventional ones.

Language through literature

Literature has always been a source of entertainment and inspiration for all. The various literary forms especially like the stories, poems, novels, drama, etc. are always sources of enjoyment for people irrespective of their age. The fascination of the youngsters towards stories and novels and poems should be exploited in the language acquisition classes. Each piece of the text, whether it is poem or short story, should be handled in the class for the holistic development of language skills. For example, let's take the first eight lines of the simple poem "The Poison Tree" by William Blake.

I was angry with my friend:
I told my wrath, my wrath did end.
I was angry with my foe:
I told it not, my wrath did grow.
And I watered it in fears,
Night and morning with my tears;
And I sunned it with smiles,
And with soft deceitful wiles.
And it grew both day and night,
Till it bore an apple bright.

Let us see how this text can be used for language acquisition. Following are the strategies:

1. Allow the students to read the poem silently and grasp and share what they could understand through self reading. Whether the student gives the expected meaning or not, the teacher should be able to appreciate the student's effort to comprehend something by self effort

2. Let the teacher read the poem in proper tone and pitch and modulation. Then ask the students whether they have got any new idea. Give opportunity for as many students to speak

3.Explain the meaning. Then indulge in activities such as: asking them to imagine a situation where they were angry with their friend; encourage them to explain that context and to share how they will react

4.Tell the students to write down a situation where they were angry / where their friendship was affected due to some misunderstanding; and also to explain how they managed to overcome/ solve it. Give them the opportunity to read out what they have written. Appreciate them

5.Tell the students to draw a picture of a person nurturing a plant / an expression of the message of the poem and to give a description of his drawing

6. Ask the students to visualize a situation where they were angry with somebody, and then to develop a conversation with the person to solve the conflict

7. Make them enact the conversation through a role play

8. Besides this, the teacher can ask the students to frame sentences using the difficult words; they can be asked to find out the synonyms, antonyms, homophones and homonyms and thus to strengthen their vocabulary

9. Ask the students to write down as many words as possible related to the situation described in the class

10. Explaining a situation where two friends got into enmity, ask them to write a letter to the friend in conflict, explaining and admitting the misunderstanding caused

Thus, through a small piece of literary text a creative teacher can provide immense opportunities and live situations for students to use the language in the most effective way. A continuous practice of this sort of language classes will definitely enable the students acquire high proficiency in this foreign tongue.

Language through discourse method

This is also a similar method like that of language acquisition through literature. Here live situations are provided based on the given text and the students are asked to create different literary forms. It is a highly creative platform for language acquisition. If the text contains a story on market with the picture of a market, the students are first asked to describe what they see in the picture. This can be termed as descriptive composition and paragraph writing. Then they are asked to recall a similar situation from the real life. They start describing real life situations. As per the creativity of the teacher, the teacher can ask the students to prepare a suitable poster for the market, a notice regarding some discount, an advertisement and then a role play of the situation. The teacher can also ask the students to write a letter to their friend about the specialties of this market. They can stand up and speak suggestions for improvement of the hygiene, more convenient arrangement of stalls, better exhibition of items, etc. The above mentioned activities make the students empower themselves with communication competency. Since the situations are from real life situations, the students feel more comfortable to give expression to their views, ideas and feelings. Discourse method encourages natural method of expression.

Language through integrated approach

Integrated approach, as the term suggests is a holistic approach (Mathew, 2005). Here we give up the traditional / conventional system of teaching English in compartments like Grammar, Literature, Prose, Composition, etc. A student must get the basic grammar of the Language from his elementary classes / from his school curriculum. In the higher education, let the focus be on holistic approach. Teaching grammar and grammar classes are the most boring and strenuous part of language teaching. The cause for this boredom is due to the isolation of grammar from the language. So the focus of the teacher should be to strengthen the grammatical correctness without the direct knowledge of the students.

A creative teacher can ask the students to find out the different parts of speech from the given text. Teacher can ask the students to frame sentences of their own, using the different conjunctions from the poem. They can be asked to select the sentences spoken directly, exclamatory sentences, sentences where the subjects are not active, sentences asking questions and so on. This approach will make the students do the work with a competitive spirit. Teacher can conduct these activities in groups. This approach will enable the students to acquire the knowledge of the language at ease and comfort and with fun.

Another aspect of integrated approach is to approach the subject in collaboration with many other subjects. For example: the poetry text of "The Poison Tree" (Blake). A teacher who handles that poem can lead the student to the discussion of how plants grow. What are the components essential for the growth of a plant; and then bring these bits of information to the figurative aspect of the poem. The description of poison seed growing into a tree and bearing a poison fruit should make the students think about how our vicious acts give birth to worse damages. The admission of the poet about his anger towards his friend can point too many such or greater lessons for a healthy and happy life of humanity. The suppression of negative emotions and their harmful effects can be used as the eye opener for the students to be better individuals. Lot of moral values can be introduced to the students and they can be encouraged to share their experiences. English is a subject which opens the door to many other subjects resulting lively discussions, debating and wide exposure. For integrated approach, the language teacher should have a real passion and commitment to the objective of the language teaching. This approach will enable the ELT to enable the students to be better individuals with excellent communication competency.

Technology assisted language acquisition

Being the products of the modern world of technology, the present generation is blessed with very impressive expertise on the use of technology. Even from the younger age a child is well versed with the use of computer and its various applications. In fact the present students possess a treasure house of knowledge in the form of this small box called the PC / the Lap top. Children are blamed a lot for spending most of their time with the computer. A committed language teacher can exploit this blame on the children by channelizing the child's infatuation for the computer in a constructive way (Lindstromberg, 1997; Meenakshi and Sangeeta, 2011). The teacher can assign many items of research project for the students to prepare by surfing. Book review, movie review, sending e-mails, resume samples, report samples, variety of advertisements, notices and many types of formal writings can be introduced to the student live, using technology. When the student is given the freedom to choose and visit the types of activity by himself, the involvement and commitment will be remarkable. No student will bunk a class which provides them practical knowledge in innovative and interesting way. No doubt, use of multimedia for language acquisition will be the most effective means for language acquisition in class room situation.

Live situations

This is the most advanced and the most interesting live methodology for language acquisition. A creative teacher can provide live situations for students to acquire language. This method should be started from a very friendly atmosphere. One experience in front of the friends / class mates will make the students more confident and efficient. Report writing is one of the driest topics to teach. A teacher who makes the format thorough to the students can divide the students into groups assigning with some internal topics.

Guide them perfectly to present the report. Next assignment can be on a formal topic which will naturally make the students to be more serious and responsible. Let them interview people, prepare questionnaire survey and follow different types of data collection. The various tasks involved in the successful accomplishment of such language activities will definitely result in becoming confident and competent communicators in this foreign tongue.

British Council of Teacher Education (BCTT) is doing a commendable on line service for learners of English language, providing proper articles (Creating a Class Play, Learning English through Children's Literature, Motivating people to read etc.), books and audiovisual aids on different sections (Listening, Literature, Methodology, Pronunciation, Reading etc.) and conducting on line courses and workshops on teaching English.

Conclusion

For an Indian student, competency in this colonial language called English can be achieved only by creating an atmosphere where they can use this language effectively and abundantly. Hence it is the EL teachers who can do a great deal in this issue. The language teacher should possess and exhibit commitment, passion, creativity and ambition to achieve the major goal i.e. language acquisition. A lot of planning, preparation and hard work are needed from the teacher to sustain the curiosity, appreciation and interest of the students. Once the language teachers start functioning and proceed systematically to attain their goal, achievement of communication competency in English language will become a joyful and comfortable task for the taught.

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Effectiveness of CSPAM Strategies in Learning Mathematics by Fourth Standard Students

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Abstract

The 'Concept - Skill, Process, Attitude and Metacognition' (CSPAM) - mathematics strategies are child-focused, and seeks to make sure that the student gains a full and complete understanding of the fundamental mathematical concepts, rather than merely memorizes a rote collection of facts. This approach not merely enhances mathematical learning; it also offers a firm foundation from which broader mathematical principles can be extrapolated. The present study tries to find out the effectiveness of CSPAM mathematics strategies in learning mathematics among fourth standard students. Two equivalent group experimental-designs are employed for this study. The investigator has chosen 64 Fourth standard students for the study. According to the scoring of pre-test, 32 students were chosen as control group and 32 students were chosen as experimental group. Finally the investigator concludes; (a) the experimental group student is better than control group students in their gain scores. (b) There is no significant difference between control group and experimental group students in their pre test scores and post test. (c)There is significant difference between control group and experimental group students in the scores of post-test attainment of knowledge, understanding and application objectives.

Key words: Learning, mathematics, strategies, CSPAM, effectiveness

Introduction

At present majority of mathematics teachers follow the traditional methods of instruction in schools. What is required is learner centred-approach to enable children to work on their own with little from the support from the teachers. When teachers carry out instructional process in the classroom, learner tends to be more passive listeners. (Joseph, 2004).

No lesson can be effective unless there is effective pupil participation in it. In order to enable the learners to participate in the instructional process, there is an imperative need to adopt some kind of learner- centred new approaches in the classroom (Kumar, 2000). Teacher should always try to keep the interest of child in mind. Correlating the subject matter with the problem of life can awaken interest. Teaching should be child centred. New knowledge and experiences should be linked with the previous knowledge to arouse interest of the pupils.

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In the United States, Concept, Skill, Process, Attitude and Metacognition (CSPAM) mathematics strategies form a teaching method based on the primary text books and syllabus from the national curriculum of Singapore. These textbooks have a consistent and strong emphasis on problem solving and model drawing, with focus on in-depth understanding of the essential math skills recommended in the National Council of Teachers of Mathematics (NCTM) Curriculum Focal Points, the National Mathematics Advisory Panel, and the proposed Common Core State Standards. Explanations of math concepts are often just a few words in a cartoon balloon so that students can read it easily.

One of the strategies teachers employ in Concept, Skill, Process, Attitude and Metacognition (CSPAM) mathematics strategies is a technique called the "bar model". Students as young as third grade are taught the model and use it to visualize and solve problems on their own. For example, a teacher gives the students a problem: "Jessica and Jillian have 235 stickers. Jessica has 115 stickers. How many does Jillian have?" Students first draw a single bar with two sections, also called the part-whole model. On top is one long line, with the number 235 above it. Underneath that line is a bar split into two equal-sized sections. Underneath the bar are two lines side by side with arrows at the ends of each, meeting in the middle of the bar. The first bar is labelled with the number 115 and the second bar is not labelled, or is labelled with a variable, such as x. In doing this, students represent the problem both symbolically and algebraically. They use the symbols to write the number sentences like the one in the example, 235 - 115 = x. Then, the students solve the problem and discuss how they found that answer with the teacher and other students.

In Singapore, although the study of mathematics is compulsory both in the primary and secondary schools, the breadth and depth of mathematics taught to pupils depend on their ability. Core mathematical concepts are common to all courses and the depth to which the topics are taught at a particular year level differs among the courses. The school mathematics curriculum has mathematical problem solving as its primary goal. The attainment of this mathematical ability is dependent on five inter-related components – Concepts, Skills, Processes, Attitudes and Metacognition (CSPAM) (Fig.1)

Figure 1: CSPAM mathematics strategies

Concepts refer to the basic mathematical knowledge (numerical, geometrical, algebraic and statistical concepts) needed for solving mathematical problems. Skills refer to the topic-related manipulative skills (estimation and approximation, mental calculation, communication, use of mathematical tools, arithmetic manipulation, algebraic manipulation and data handling) that pupils are expected to employ when solving problems. Processes refer to the thinking skills (classifying, comparing, identifying attributes and components, sequencing, induction, deduction, generalization, verification and spatial visualization) and heuristics (acting out, use of a diagram/model, use of guess and check, making systematic list, looking for patterns, working backwards, use of before-after concept, making suppositions, restatement of problem in another way, simplification of problem, solution part of the problem, thought of a related problem and use of equations). Attitudes refer to the affective aspects of learning mathematics like: enjoying doing mathematics, showing confidence in using mathematics, persevering in solving a problem and appreciating the beauty and power of mathematics. Metacognition refers to the ability to control one's own thinking processes in problem solving. This includes: constant and conscious monitoring of the strategies and thinking processes used in carrying out a task, seeking alternative ways of performing a task and checking appropriateness and reasonableness of answers.

Discussion

Need for the study

Concept, Skill, Process, Attitude and Metacognition (CSPAM) mathematics strategies are explained in a true spiral, meaning that each and every basic subject is taught and the revisited again and again, each time at a higher phase and integrating more advanced and difficult questions. Many other systems claim their instructing on a spiral; however, in reality it can be more of a circle, with every introduction of a topic starting at the beginning. CSPAM presumes and requires the kids to retain the things they learn and build upon it. Repeating is important in any sort of mathematical lessons; however, in CSPAM, repetition is frequently integrated into mastering a subsequent concept, so that the students feel like progressing and uncovering, and not just simply repeating for the sake of it. This translates into far better retention with much less perceived effort on the part of the students. Mathematics is considered as an abstract concept. In schools majority of the students feels that mathematics is purely a theoretical subject which is to be discussed only on black board or slates. Also they feel that mathematics as a very difficult subject. But this faulty opinion about mathematics can be reversed with the help of integrating CSPAM strategies in teaching and learning. The investigator desired to examine the "Effectiveness of CSPAM Strategies for learning mathematics by Fourth Standard Students" using a research study on a selected sample.

Operational definition of key terms

Effectiveness

Effectiveness refers to the adequacy of accomplishing a purpose as well as producing the intended or expected results. This study measures the effectiveness in terms of the achievement scores of the students if the riddles way of instruction is used in learning mathematics. The effectiveness of riddles integrated in teaching mathematics has been studied by an experimental method.

CSPAM strategies

CSPAM strategies provide a model of teaching methods, focusing on mathematical problem solving and emphasize conceptual understanding in skills proficiency, learning of process skills, metacognition, and the development of a positive attitude toward mathematics. A strategy is a plan of action designed to achieve a specific goal. Strategy is all about planning to achieve (or preparation to gain) a position of advantage over adversaries or best exploiting emerging possibilities. Concept, Skill, Process, Attitude and Metacognition (CSPAM) mathematics action plan is called as CSPAM mathematics strategies.

Learning

Learning is acquiring new or modifying existing knowledge, behaviour, skills, values, or preferences and may involve synthesizing different types of information.

Mathematics

Mathematics is a collection of symbols, notations and numbers (James, 2005) and is considered as the queen of sciences.

Fourth Standard Students

The students under going primary school education in standard IV.

Objectives of the study

- To design and develop CSPAM strategies for the selected content in learning and to examine the effectiveness of the CSPAM strategies in learning mathematics by the Fourth standard students
- To find out and compare the performance through the mean of the assessment scores of control and experimental groups of sample students, through tests
- To find out and compare the mean scores of the control and experimental group of students in their attainment of knowledge, understanding and application objectives through tests
- To find out whether there is any significant difference in the scores of control (Conventional teaching) and experimental (CSPAM strategy based teaching) group of students in their pre- as well as post-tests. Also, 1, to examine any significant difference between control and experimental group in attainment of knowledge, understanding and application objectives through and 2, any significant difference between pre-test and post-test scores of the two groups in their attainment of knowledge, understanding and application objectives

Hypotheses of the study

The following null hypotheses, related to the objectives listed above, are chosen:.

1) There is no significant difference between control and experimental group of students in their assessment scores through pre- as well as post-test

2) There is no significant difference between the control and experimental group in their gain in attainment of knowledge, understanding and application objectives

3) There is no significant difference between control and experimental group of students in their pre- as well as post-tests

4) There is no significant difference in pre-test and post-test scores of the experimental group of students in their attainment of knowledge, understanding and application objectives

5) There is no significant difference between the means of the pre-test and post-test scores of experimental group of students with respect to knowledge, understanding and application objectives

Methodology

Two equivalent groups of experimental-designs are employed for this study.

Selection of sample.

The investigator has chosen 64 fourth standard students from Thendral Nursery and primary school, Peraiyur, Madurai District, T. N. for the study; equal number (32) of students were selected for control and experimental group.

Tools used for the study

The tools used for the present study are:

1. Concept, Skill, Process, Attitude and Metacognition (CSPAM) Mathematics Strategies for the selected content (Melody and Donna, 2008)

2. Achievement test in Mathematics (Pre- and Post-tests) (Mariappan, R. *et al.*, 2010)

Conducting the experiment

a) *Administration of the pre-test*

Just before the treatment proper, an entry behaviour test was administered and found that all the selected samples possessed the entry behaviour. The bio-data of the samples were also collected. Pupils accommodated at a convenient and comfortable place were supervised during the tests. Pre-test was administered and the answers were analyzed. The means of the pre-test scores of both experimental and control groups were same; standard deviation also was not much different, indicating proper match of the two groups.

b) *Administration of the post-test*

The parallel form of post-test questions was given to the students of both the groups and their results were statistically analyzed to assess the efficiency and effectiveness of CSPAM Strategies method.

c) *Treatment*

The experimental group of 32 students was taken to the separated class. These students were taught by the investigator with CSPAM strategies. Corrective feedback was given wherever necessary. The treatment has been given for 60 minutes per day. The CSPAM strategies were applied by the investigator for fifteen days. The control group of 32 students was given regular (traditional) classroom treatment by the investigator, for the same time of instruction and number of days as the sample group.

d) *Test administration and scoring*

After completion of the training session, post-tests were administered to both groups. The objective assessment scores of the post-tests were transferred to the data sheet.

Statistical techniques used

Statistical techniques help to classify, organize and summarize numerical facts and draw conclusions (Aggarwal, 1990). Descriptional, Differential and Inferential Statistics were used for the study; this includes Mean, Standard Deviation and 't' test.

Basic subject

There is no significant difference among science and arts teacher educators in their perception on the pedagogical benefits of blog and wiki. This can be attributed to the universality of technology in its applications. Both arts and science teachers got some exposure of using computers in their school days and likely enhancement of awareness on technological instruments. They have equal opportunity to interact with the society through technology and develop further interest.

Analysis and findings

The data generated for testing each of the five hypotheses were tabulated and presented in Tables 1-5 for convenience.

Hypothesis1 (There is no significant difference between control and experimental group of students in their assessment scores)

Table 1: Difference between control and experimental groups in their gain scores

Group	N	Mean	S. D.	Calculate 't' value	Remarks at 5% level
Control group	32	12.75	8.71	10.80	*Significant
Experimental group	32	35.84	8.39		

(*At 5% level of significance the table value of 't' is 2.02)

It is evident from Table1 that there is a significant difference between control and experimental group students in their gain scores. The experimental group is better than the control group in their gain scores. Hence, the CSPAM Strategies are effective for learning mathematics by Fourth standards students.

Hypothesis 2 (There is no significant difference between control and experimental group of students in their gain in attainment of knowledge, understanding and application objectives).

Table 2: Difference between control and experimental groups in their gain scores in attaining the objectives

Objectives	Control group		Experimental group		Calculated 't' value	Remarks at 5% level
	Mean	S. D.	Mean	S. D.		
Knowledge	4.94	3.59	7.56	2.25	3.50	*Significant
Understanding	5.69	4.86	13.84	3.61	7.61	*Significant
Application	2.50	2.27	14.44	6.07	10.42	*Significant

(*At 5% level of significance the table value of 't' is 2.02)

Table 2 reveals that there is significant difference between control and experimental group of students in their gain scores for attainment of knowledge, understanding and application objectives.

Hypothesis 3 (There is no significant difference between control and experimental group of students in their pre- as well as post-tests)

Table 3: Difference between pre-test and post-test scores of the control and experimental groups

Group (N = 32)	Control group		Experimental group		Calculated 't' value	Remarks at 5% level
	Mean	S. D.	Mean	S. D.		
Pre-test	42.66	5.99	42.63	5.84	0.02	Not Sig.
Post-test	55.41	8.30	78.47	7.03	11.99	*Significant

(*At 5% level of significance the table value of 't' is 2.10)

Table 3 shows that there is no significant difference between pre-test scores of control group and experimental group; but there is significant difference between them in their post-test scores.

Hypothesis 4 (There is no significant difference between the means of the Post-Test scores of control group and experimental group with respect to knowledge, understanding and application objectives)

Table 4: Difference between control and experimental groups in their post test scores for attaining the objectives

Objectives	Group	Mean	S. D.	't' value	Result
Knowledge	Control	22.13	3.29	4.43	*Significant
	Experimental	24.94	1.43		
Understanding	Control	22.41	4.24	8.64	*Significant
	Experimental	30.72	3.41		
Application	Control	10.88	3.90	9.50	*Significant
	Experimental	22.81	5.94		

(*At 5% level of significance the table value of 't' is 1.96)

It is clear from Table 4 that there is significant difference between control and experimental group of students in their post test scores for attainment of knowledge, understanding and application objectives.

Hypothesis 5 (There is no significant difference between the means of the Pre-Test and Post-Test scores of experimental group of students with respect to knowledge, understanding and application objectives)

Table 5: Difference between pre-test and post-test scores of experimental group of students for attaining the objectives

Objectives	Pre-test		Post-test		't' value	Remark
	Mean	S. D.	Mean	S. D.		
Knowledge	17.38	2.35	24.94	1.43	18.95	*Significant
Understanding	16.88	2.07	30.72	3.41	21.68	*Significant
Application	8.38	3.31	22.81	5.94	13.45	*Significant
Total	42.63	5.84	78.47	7.03	24.15	*Significant

(*At 5% level of significance the table value of 't' is 1.96)

Table 5 exhibits clearly that all the obtained 't' values are more than the critical value at both level of significance (0.05 level) and hence, the null hypothesis is rejected; there is significant difference between pre-test and post-test scores of the experimental group in their attainment of knowledge, understanding and application objectives. Also it is evident that the experimental group, after undergoing learning mathematics in CSPAM strategies, gained more in the learning objectives.

Interpretation and analysis of results

The data presented in Tables 1-5 and the brief inferences made after each of them clearly reveal the higher performance of the experimental group of students in learning mathematics. This is attributable to the difference in the learning strategy (CSPAM), they followed and the one (Traditional) followed by the control group. What is observed for mathematics can logically be extended for other subjects, especially science topics. Teaching with audiovisual aids increases attention and interest of the taught and predominantly for the young ones. CSPAM strategies developed and used in the present venture appear quite effective for improved teaching learning processes for all, more so for young children. This strategy strengthens students' mental mathematical abilities, helps students master basic mathematical facts and makes learning mathematics more engaging and interesting.

The 't' test result also shows that the experimental group students are better than the control group students in attainment of knowledge, understanding and application level objectives in the gain score. This may be due to the fact that CSPAM strategies have motivated the students to understand the concepts of Mathematics. Since the pictures and explanations of the CSPAM strategies are designed by charts, flash card, flash player and media player, it influenced the fresh minds of experimental group students very effectively. Thus, the experimental group is superior to control group in attainment of knowledge, understanding and application objectives.

The better performance of the experimental group of students than the control group is effected only by the difference in the teaching strategy used. Like many other modern methods of teaching to enhance the attention and sustain the interest longer, CSPAM strategies help pupils visualize situations, create concrete pictures from abstract situations, facilitate learning through seeing and doing, transform words into recognizable pictures and so on.

In general, CSPAM mathematics strategies are effective in developing students' fluency with fractions, decimals, percentages, ratios and proportions, replacing mathematical anxiety with mathematical affinity followed by love for the subject.

Educational implications of the study

According to Singapore's handbook for mathematics teachers in primary schools (2010), this model drawing approach is helpful for several reasons:

- It helps pupils visualize situations
- It creates concrete pictures from abstract situations
- It facilitates the pupils' learning through seeing and doing
- It transforms words into recognizable pictures in young minds

There are many advantages of opting CSPAM mathematics for children. Most important is that this method encourages asking questions, and thus enables the students to be active and attentive, achieving deeper understanding. The interesting thing about this approach is that through CSPAM strategies, there is always a syllabus which is coherent and well focused. The sequences of the topics covered, are strategic and well articulated allowing in-depth understanding. Something, students, especially children, find very interesting about CSPAM strategies is employment of a number of different methods for teaching from concrete to pictorial as well as abstract, enabling the students to grasp the essence of the teaching (Xavier, 2005).

Thus CSPAM mathematics strategies

- Strengthen students' mental mathematical abilities
- Help students to master basic mathematical facts
- Make mathematics more engaging and interesting
- Develop students' fluency with fractions, decimals, percentages, ratios and proportions
- Replace mathematical anxiety with mathematical affinity
- Guide students to learn multiple methods for informal assessment
- Make students proficient in problem solving

Conclusion

The high effectiveness of the CSPAM mathematics strategies in learning mathematics has been tested and found true by conducting the experiment on a limited number of Standard 4 students. The students who underwent training in this mode exhibited higher grasp of the subject revealed by comparison with the performance of the control group, under similar conditions except the methodology of teaching. The observation and inference made for mathematics, for a limited sample of Standard 4 children, can logically be extended for other subjects, especially science topics and school children of other standards highlighting the superiority of the CSPAM strategies.

CSPAM mathematics strategies are explained as a true spiral, meaning that each and every fundamental topic is taught, and then revisited repeatedly, each time at a greater phase and combining more advanced and complex topics (Francis and Pritchard, 2002). Repetition is essential in any sort of mathematical lessons, but here the repetition is frequently included in grasping the following concept, so that it makes the learners feel like growth and discovery, rather than mere repetition for the sake of it. This encourages enhanced retention with reduced perceived effort on the part of the learners.

Perhaps the most renowned aspect of the CSPAM mathematics system is the wide utilization of line segments graphically represented as colourful bar models. While the application of this kind of line segments to assist in visually representing mathematical concepts is not new, the use of these types of bar models in Singapore texts has attracted significant international interest.

CSPAM mathematics strategies is an approach to develop in the students, an in-depth mathematical understanding through concept building activities, unique mental mathematics strategies, problem solving methods and focus on mastery (Nalayini, 1991). The big ideas of the 'Concept, Skill, Process, Attitude and Metacognition' (CSPAM) mathematics curriculum are Number Sense, Making connections, Visualization and Communication.

Books and curricula in accordance with the 'Concept, Skill, Process, Attitude and Metacognition' (CSPAM) mathematics method are now in use in a number of countries, including USA and Israel. Students utilizing these materials are already demonstrating meaningful gains in mathematical tests (Thiyagu, 2006). There are obstacles, limiting the spread of this approach, such as lack of teachers qualified in the correct application and utilization of this curriculum, and some problems in adapting the Singapore approach books to satisfy the state and local educational priorities and learning requirements. Despite the minor hitches, there is no doubt that CSPAM mathematics strategies hold a high potential for widespread application and deeper penetration into school education across the world.

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Barriers in Quality Teacher Education Programme in Tamil Nadu

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Abstract

Education is the backbone of developing nations like India. No doubt, education plays a very significant role in nation's development. To sustain growth and development, provision of quality education at all levels - primary, secondary as well as higher education, including teacher education – is necessary. The quality of education is greatly determined by the quality of teachers at all levels. There have been great efforts made in the past and still being continued to improve the quality of teacher education. Yet, not much improvement in general education is achieved. This situation makes us to analyze the teacher education programmes and find its weaknesses. A few suggestions to overcome the deficiencies of teacher education training and thus to facilitate general education are presented.

Key words: quality, teacher education, teaching methods, TNTEU

Introduction

Education is the backbone of developing nations like India. There are many higher education programmes in India. Among them, Teacher education is one of the important sub divisions of higher education. Quality assurance is the key to success in any system. Generally the quality of education is greatly determined by the quality of teachers at all levels. The qualities of teachers are always based on quality teacher education system. Before we introduce innovative ideas and process for enhancing the quality of teacher education programme, we should understand some weaknesses of our teacher education programme and ways to overcome those weaknesses.

Discussion

Meaning of quality

"Quality" can be defined as the degree to which a specific product satisfies the wants of a specific consumer (Pounder, 2000).

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Meaning of teacher education

Teacher education refers to the policies and procedures designed to prepare teachers with the knowledge, attitudes, behaviour, skills, etc. required to perform their task effectively in the classroom, school and community.

When can we say, we have quality teacher educational system?

When our teacher education institutions succeed to produce the right type of teachers to satisfy the needs of students, parents, schools and the society, we can proudly say, we have a quality teacher educational system.

Authorized bodies of teacher education

National Council for Teacher Education (NCTE) - all over India
Tamil Nadu Teachers Education University (TNTEU) - all over Tamil Nadu

NCTE (National Council for Teacher Education)

National Council for Teacher Education (NCTE) is established in 1995 under the National Council for Teacher Education Act, 1993 to formally oversee standards, procedures and processes in the Indian teacher education system. It has head quarters in New Delhi. It has four regional centres in Bangalore, Bhopal, Bhubaneswar and Jaipur.

Objectives of NCTE

- To achieve planned and coordinated development of teacher education
- To regulate and maintain the norms and standards of teacher education system
- To monitor the overall functions of the teacher education institutions in India

TNTEU (Tamil Nadu Teachers Education University)

TNTEU is the first and only one university for teacher education in India which is situated in Chennai. TNTEU is established in 2008 under the government of Tamil Nadu enacted act no. (33) of 2008 *for promoting excellence in teacher education.*

Objectives of TNTEU

- To provide quality teacher education
- To monitor teacher education colleges
- To enhance human values through teacher education
- To make college of education excel through innovative teaching, research and extension activities

Obstacles in quality teacher education programme

Though various educational bodies and the government are taking many steps to improve the quality of teacher educational programmes in Tamil Nadu, some barriers are decreasing the quality of the teacher education. They are:

Poor selection process

In Tamil Nadu, after completing the under graduate degree, students write TANCET exam to get M. B. A., M. C. A. and M. E. admissions. In Maharashtra, Nagpur University conducts CET for B. Ed. admission. Similar to them, there is no teaching related aptitude, interest and attitude test for B. Ed. or M. Ed. admission in Tamil Nadu (Sharma, 2004).

Lack of time duration

Though the Bachelor of Education (B. Ed.) is an undergraduate degree, the duration of B. Ed. course is one year only (Saxena and Mishra, 2012). During this one year, the effective session is eight to nine months only which is not enough to produce right kind of teachers with different skills like techno-pedagogic skills, inter-personal skills, social skills, etc.

Deviation in teaching practice

Teaching practice plays a significant role in B. Ed. programme. Its main purpose is to help the student teachers to understand and practice the real teaching situations. But the non-seriousness of the student teachers, poor cooperation among the institutions, other duties in the schools and short time duration are all negatively influencing the purpose of teaching practice (Aggarwal, 2004).

Faulty method of teaching

In teacher education syllabus, student teachers study different type of teaching methods like project method, team teaching, heuristic method, questioning method, buzz session, play way method, library method, etc.; but they never use them, as teacher educators teach lessons through lecture method only (Sharma, loc cit). In most of the institutions, students are encouraged to study a particular book authored by certain teacher educators and published locally.

Lack of co-curricular activities

In teacher education course, student teachers are always doing mark oriented activities like drawing charts, preparing teaching aids, writing lesson plans and assignments, etc. only. There is no place for NSS, NCC, sports and games, educational tours, seminars, conferences, educational exhibitions, etc. in most of the teacher education institutions.

Incompetent teacher educators

According to the guidance of NCTE, UGC fixed some minimum qualification for assistant professor for college of educations. NET or SET / Doctoral degree was expected for assistant professor's post; but in reality, many teacher education institutions do not have teachers possessing the NCTE prescribed qualification (Aggarwal, *loc cit.*).

Lack of proper facilities

In Tamil Nadu, many private teacher education colleges are functioning without proper building, library, laboratories, hostel and proper recreation and sanitation facilities (Saxena and Mishra, 2012). Some colleges show one building for different purposes. In some colleges library is functioning as a store room.

Insufficient financial grants

In most of the states teacher education is conducted by the fee collected from student teachers. Hence the management is refusing to provide necessary facilities for the college (Saxena and Mishra, *loc cit.*). Government and Aided institutions get grant from the government. They collect the fee prescribed by the TNTEU. But most of the private institutions – especially the self financing category - are functioning based on students' fee, often collecting more than government prescribed directly or indirectly. It is hoped that things would improve with the active functioning of the proposed Rashtriya Uchchatar Shiksha Abhiyan (RUSA), a centrally sponsored scheme for higher education, in a mission mode to focus on state higher educational institutions (Thyagarajan, 2013). It is for the first time since independence that state level higher education institutions are being funded by the centre with a budget of 1, 28, 000 crores.

Isolation of teacher education

Teacher education and general education both are closely related. Teacher education colleges produce the quality teachers for the general school educational system. School education is considered as consumers and teacher education is considered as producers. The sad fact is there exists no proper understanding, interaction and sharing between the teacher education colleges and the schools as well as colleges and universities (Radha Mohan, 2011).

Absence of professional attitude

Nowadays many teacher education colleges are functioning exclusively as commercial centres instead of educational training centres (Saxena and Mishra, *loc cit.*). They collect the fees as they like.

In another aspect, enrolment is full in some teacher education colleges; but, the physical presence in the face to face mode is very scanty. Though they are in regular college mode, they are functioning like distance education study centres.

Step motherly attitude

The government's consideration for teacher education is inadequate unlike in the case of school, medical, engineering, law and management education. It allocates the minimum funds to the teacher education development. Government conducts counselling for admission of B. E., M. B. B. S., M. B. A. and M. C. A. for all government, aided and private colleges. But in B. Ed. counselling is only for government and aided colleges. Every year government conducts counselling for only 21 teacher educational colleges leaving many more (above 600) other teacher education colleges, allowing admission according to the college's choice.

Suggestions to overcome the barriers in teacher education

A few suggestions for improving the condition and function of teacher education are:

Proper admission procedures

In a 2010 report by National Council for Teacher Education (NCTE), it was estimated that India needs an additional 1.2 million school teachers if it is to fulfil the Right to Education Act requirement of 1:30 teacher-student ratio across the country. To meet the vision of the RTE, India needs to focus both on increasing the supply of teachers (an estimated 1.2 million teachers are required), but perhaps even more important is to improve the quality of our Teacher Education Programs [in 2012, only 1% of teachers who sat for the Teacher Eligibility Test (TET) passed the TET and 3% candidates only cleared the retest in Tamil Nadu. In 2013, only 4% only passed in TET exam held in Tamil Nadu.]. While there are many candidates who are 'eligible' to become teachers, very few possess the required competencies. So we should start our corrective masures right from the selection for admission to teacher training instititutions. Selection procedure should be improved; it has to be based on interviews, group discussions, teaching aptitude test or general awareness test (Sharma, *loc cit.*).

Sufficient time duration

Duration of teacher education should be increased to two years for obtaining the quality teacher education (Sharma, loc cit). Recently Kerala announced two years for B. Ed. Programme to enhance the quality of teacher educational programme and prepare the quality teachers to fulfil the need of RTE Act, 2009. Academics and public should impress on the government of the respective states and universities to follow suit for effective human resource development starting with schools.

Increasing teaching practice time

Provision of compulsory Internship for adequate period for the exposure of the student-teachers to all the functions of the school as in the case of other professional training courses (Singh, 2007).

Attractive and interactive method of teaching

Teacher educators should not be content to use the least effective lecture method; but include other methods like multimedia teaching, team teaching, video conference method, project method, employing modern classroom communication devices (Sharma, *loc cit.*).

Co-curricular activities

Several types of co-curricular activities like NSS, NCC, games, craft, yoga, etc., should be included in the TNTEU curriculum.

Competency of teacher educators

Teacher educators should be well qualified as per the NCTE norms and capable of creating interest and ability in communication skills in the taught. Teacher educators should develop their competency to use ICT (Radha Mohan, *loc cit.*).

Adequate facilities for students

Proper building, laboratory, library and sanitation facilities have to be ensured in every college of education. Adequate number of teaching and non-teaching staff should be appointed in teacher education colleges.

Government funding

The state and central governments should make adequate provision of funds for teacher education colleges and departments (Saxena and Mishra, *loc cit.*). More than 600 teacher education colleges are functioning in Tamil Nadu. Government should create regional centres for TNTEU in different regions of Tamil Nadu like Anna university regional centres, to establish and maintain quality education at all the teacher education institutions.

MOU with other organizations

Teacher education colleges should establish MOU with other institutions like schools, colleges, universities, NGOs, hospitals and government departments. Collaborating with those organizations professional growth oriented seminars, conferences and trainings may be conducted at frequent intervals.

Proper evaluation and guidance

Regular and rigorous inspection by NCTE and university should be conducted on teacher education institutions (Singh, *loc cit.*). Conditions for affiliation and additional intake should be made stringent. TNTEU must create regulatory committee to inspect the teacher education colleges frequently.

Government attitude

Teacher education, like medical education or technical education must receive importance from government. Government should encourage some in-service programmes for teacher educators, as done for school education, through TNTEU.

Conclusion

When we realize our faults and take necessary steps to correct them, we are in the process of progress and improvement. Teacher educators, institutions, policy makers, curriculum framers and government should go through the barriers in quality teacher education programme and take earnest efforts to enhance the quality in teacher education which controls the quality of human resource development and its demand. The authors have tried to enlist some of the existing maladies of teacher education training and hurdles in the existing model to attain quality, along with a few remedial suggestions to improve functioning of teacher education training institutions. The expectation of the public, academic community and the whole nation for developing human resource development through the service of quality teacher trainees has to be seriously considered by all stake holders of education and human resource development.

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