NATIONAL INSTITUTE OF

TECHNICAL TEACHERS TRAINING AND RESEARCH

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CHENNAI   600 113   INDIA

EDITORIAL

We are glad to bring out Volume 23, No. 1 of the Journal of Technical and Vocational Education and we thank the authors for their valuable contributions. All the articles and research papers in this volume will be of great interest to our readers.

Engineering education in our country is predominantly delivered through the direct mode of instruction. Since a revolution is taking place in Web based instruction, many universities have started offering on-line / off Campus degree programs. Dr. Rajarshi Roy and faculty in their article titled "Attitude of the online engineers towards distance mode of Instruction and some related issues" have discussed the attitude of people pursuing further education and they have also analysed the relevance of distance mode of education in technical education.

The Technical and Vocational education is one of the key areas in promoting the welfare of the disabled. The article by Dr. B.G. Barki and Dr. S. Renukadevi concentrates on the analysis of the non formal programmes offered by the polytechnics from the perspective of Curriculum development for persons with disabilities.

The impact of information technology training on the people's daily life is enormous, particularly in the health sector. Dr. Samson Ravindran in his article titled " Early detection of breast cancer - The need and possibilities" has highlighted the need for early detection and the use of Digital mammography in the detection of breast cancer.

Dr. Nagendra Rao in his research paper titled "Removal of fluoride from water by adsorption on to Gamma Alumina, Bauxite, Cerium Hydrate and Lanthanum Oxide - An Investigation" details the problem of excess fluoride in drinking water and its removal.

National Cadet Corps in India is the worlds largest youth development organization, offering training with a military line precision. The teachers serve as NCC Officers. Shri. S. Sivapathasekaran in his article titled "A dilemma in the leadership attitude among senior division NCC Officers", explains the need for a study for eliminating reluctance in the acceptance of the post of NCC Officers.

Shri. P. Raviraj and Dr. M.Y. Sanavullah in their article titled "A new approach for morphological reconstruction of semantic layers in map images" have proposed techniques for restoration of binary semantic layers of the map images from the corruption caused by the decomposition of the image using colour separation process.

Shri. P.S. Ravichandran and Dr. B. Mukhopadhyay have presented the findings of the research study conducted to know the problems and benefits of the trainees under the Community Polytechnic Scheme.

Teachers in technical education play a great role in producing technocrats and their thinking styles do matter. Dr. Panch. Ramalingam in his article has detailed the study of thinking styles and ICT application of teachers in technical education.

Ms. K. Nirmala and Dr. T.G. Sambanthan in their article titled "Teachers' perception on non-formal computer education curriculum in Tamil Nadu" have attempted to explain opinions from the teachers on the presence of objectives in the cognitive domain in the curriculum component of the non - formal courses.

We once again acknowledge the contributions of the authors for this present volume. We welcome papers and research articles for our future issues.

– Editor

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EDITORIAL

Attitude of the Online Engineers Towards Distance Mode of Instruction and Some Related Issues

RAJARSHI ROY, SAILENDRA NATH MANDAL, SUBRATA CHATOPADHYAY and NIRMAL KUMAR MANDAL

Abstract

'Psyche of Learner' possesses tremendous impact over the process of learning. Formal education may follow numerous strategies to impart education among the learners. Engineering-education in our country usually follows a direct mode of instruction-transaction. However some Indian universities have started affiliating engineering degree programmes through their off-campus collaborative learning centers. The present paper, in its initial phase aims to explore the attitude and feeling of online (i.e., working) engineers, pursuing further education since last couple of years through distance mode, towards the mode of instruction and allied issues. Relevance of distance mode of instruction in technical education is analyzed in the penultimate section of the paper.

1.0 Introduction

Irrespective of levels, types and forms, according to modern educational psychology, students hold the central position in the formal system of education. Actually the entire system of education run for the betterment of students in various dimensions.

Technical (as well as technological) education differs from rest of the education gamut, so far the nature of students' development is concerned. It is often argued that while in the other segments of education, the basic objective of educational instruction is to develop theoretical knowledge, the central emphasis in technical education is to develop certain specific skill among the students, apart from knowledge *(Harten, 1991)*. It is to be mentioned here that skill cannot be imbibed in isolation *(Roy, 2002)*. The basic philosophy of skill-development stresses on the principle that any theory (or the theoretical concept) should be followed by appropriate practice. These are mostly considered under 'cognitive' and 'psychomotor' domain of educational objectives respectively, under various sequential sub-domains *(Simpson, 1972)*. However all these activities, i.e., developing the level of knowledge in the specific subject area and competency over certain specific skill, will go in vain until and unless the student is having a strong positive attitude and interest as well, towards the subject of study *(Roy, 2004)*. Infact, effectiveness and acquisition of knowledge by the student largely depend upon sequels of factors and variables. Students' attitude towards learning is one such major factor, possessing tremendous impact over the entire process of learning-situation. As such, interest towards certain dimension of activities possesses a

direct relation over the attitude of the individual *(Straus, 1980).*

Interest is just a complex like an amalgam of subjective feeling and objective behaviour - the tendencies, which varies in intensity and from object to object. It has close association with effort and desire. Learning, in formal system of education may follow numerous strategies. For example, direct learning in classroom situation, learning through distance mode, e-learning, self-learning through CAI packages, MMIS packages or learning through various contact sessions. Obviously all these modes of learning possess their comparative advantages and limitations *(Bonwell and Eison, 1991).*

As technological and technical education comes under the purview of All India Council of Technical Education (abbreviated as AICTE) therefore the technical educational institution in India are supposed to follow the rules and regulations framed for organizing and running various degree/ diploma programmes in technological subjects in the field of technical and vocational education. This is true for all the institutions running and offering courses like diploma, undergraduate and post graduate levels. These institutes are bound to offer courses in regular classroom setups. Hardly it may be observed that institute is permitted to offer courses through distance mode of learning. The trend is more or less similar across nation.

However there remains some exception in this trend. Now a days, some organizations and institutions, though less in number, are offering courses on technical education at degree level through their collaborative learning centers, with affiliation of some universities and are offering courses in distance mode. It is therefore clear that groups of students pursuing education through

distance mode are not having any scope to avail a direct interaction with the teachers. Even then year after year students are getting enrolled with such courses. But why is the trend continuing? This question needs to be answered by appropriate study.

2.0 Objectives of the Study

The present study attempts to explore the attitude and feelings of the diploma level engineering professionals, pursuing undergraduate degree courses in civil and mechanical engineering disciplines through distance-mode. Their attitude towards distance mode of instruction, towards laboratory used in the contact-phase, comparative cost of distance education and some other related issues were taken into consideration. Exploration of relevance of distance mode of instruction in technical/technological education was also considered as a base line objective for the present study.

3.0 Methodology of the Study

Methodology, following which the present study was carried out, is noted as follows:

3.1 The Sample

Sample for the present study incorporates one hundred and ten (110) online engineers studying in civil and mechanical degree programmes in the off-campus centers of three autonomous institutes in courses, which follow distance-cum-contact mode of instruction. Further feature of the sample accorded is, all these respondents are absorbed in professions, related to middle-level engineering occupations and are possessing engineering diploma. This group of respondents was sent to the resource institution to supplement the gap of their knowledge in a specific subject area – 'hydraulics', where the instruction imparted to them was 'direct'

in nature. Andragogic strategies of teaching were adopted to impart knowledge of hydraulics to the very group of respondents.

3.2 Definition of the Key Terms

3.2.1 Attitude

For the present study, the word attitude denotes the feeling and tendency of the respondents towards the 'distance mode of offering curriculum in engineering disciplines'.

3.2.2 Online Engineers

By the word 'online engineers' the very group of professionals is identified, who are absorbed in middle-level engineering occupation, possessing diploma in various trades of engineering, and are pursuing undergraduate degree programmes in civil and mechanical engineering through distance mode.

3.2.3 Distance Mode of Instruction

By definition distance mode of education is the very instructional delivery system that excludes opportunity for the students to be physically present in the same location as the instructor.

Distance mode of instruction, for the present study, denotes the very mode of offering curricula in which neither the teachers nor the students are having a regular opportunity of direct interaction with each other, which is accessible in conventional mode of instruction.

3.3 Tool Used for the Study

Tool used for the study includes a structured questionnaire, incorporating twenty-one items, centering round the issues as specified in the stated objectives of the study. The items included in the questionnaire was multiple-choice-type, offered with options

ranging from two to four, varying on the nature and types of those items.

3.4 Data and Its Nature

Data, obtained through the questionnaire was by nature objective. Therefore simple statistical approach was adopted to tabulate and to treat the collected data which are further supplemented by qualitative interpretation.

4.0. Analysis and Interpretation of Data

Analysis and interpretation of the study are presented in the following section:

4.1 Rating of the Respondents Towards Distance Mode of instruction

In consonance with the objectives of the study, the respondents were asked to express their views over conventional courses and courses, those are offered in distance-mode.
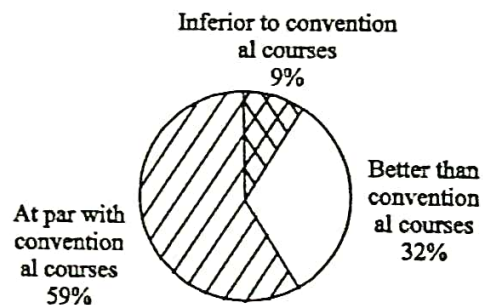
Fig. 1: Rating towards distance mode of instruction

While responding towards such a question, little less than one-third of the respondents (32%) reported that the distance-mode of learning is 'better' than the conventional mode of instruction as depicted in the Fig. 1.

It is worth-mentioning in this context that all the respondents for the present study was pursuing their engineering (at graduation level) education through distance-mode only. On other hand, a grand majority (59%) of the respondents considered distance mode of

learning as good as, or at par with the conventional courses; Whereas only 9% of the respondents reported that distance mode of learning is inferior to conventional courses.

I is clear from the response pattern that perception of grant majority of our respondent group does not find any distinction between conventional and distance mode of instruction.

4.2 Attitude of the Respondents Towards Distance Mode of Instruction

The prevailing concept of distance mode of instruction, irrespective of the subject boundary, especially in the oriental countries, considered it inferior to the regular courses (*Barr and Tagg, 1995*). However for the on-line personnel, especially in technological subjects, it is the most feasible way of pursuing further studies or to continuing with education to keep oneself up-to-date with recent knowledge and development in the respective subject area (*Reynolds, 1990*).

Responding to a question focusing over the very issue, it appears that our sample group of respondents are simply bifurcated so far their opinion over the very issue is concerned. As depicted in Fig. 2, while almost 41% of the respondents reported that even if they were assured with a seat in an engineering college, where they are supposed to attend regular classes, they would opt for the very course through distance mode.
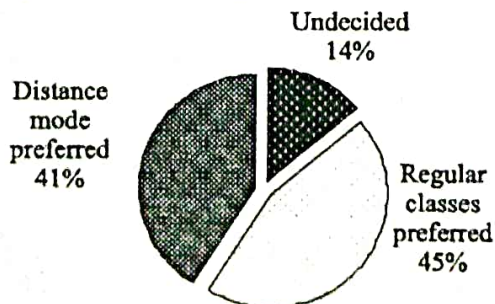
Fig. 2: Attitude towards Distance mode of instruction

On the other hand, as many as 45% of the respondents opposed the view, saying that if they got a chance to be admitted into regular programmes, they would have joined the very course, instead of the existing one, where mode of offering content follow 'distance-learning-method' incorporating some contact-sessions. Rest of the respondents (14%) tends to be undecided over the very issue.

It is interesting to note that, while online professionals often use to face problems to attend regular classroom instructions, even then, a sizable proportion of them tends to hold preconceived notion of inferior status of distance mode of learning. It may also be noted that distance mode is not that extent capable of incorporating practical exposure among the students, which is prerequisite for engineering education.

4.3 Reasons for Opting Distance Mode

As the participants were attending a course on distance mode, therefore it was asked to them, why they did join in the course, offered in distance mode. The response extracted from them in this context is presented in the Fig. 3.
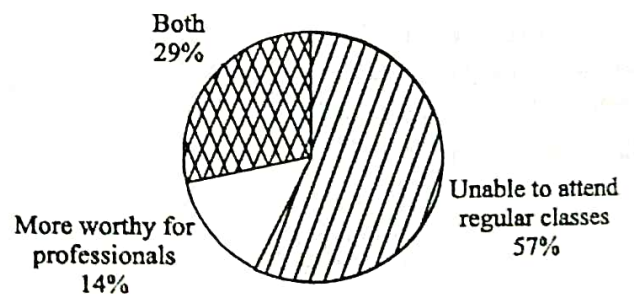
Fig. 3: Reasons for opting Distance mode

In response, majority of the respondents (around 57%) reported that the underlining reason of joining the course was, as they are on job, it was difficult for them to attend regular classes. The group, as it appears, were much frank to express the reality. However on the other hand, though less, but almost 14%

of the respondents reported that they opted for the course, considering it more worthy for the professionals. It is noticeable that 29% of the respondents reporting that they opted for the course, because, on one hand, due to be on job/service, they are unable to attend regular classless and on other hand, being professionals, they considered irrespective of the mode of offering the content, the course would be more worthy for the engineering professionals, especially at their cadre.

The observation goes in consonance with the basic philosophy of distance learning, which, among others, includes to extend education to the mid-career professionals, seeking further education

4.4 Technical Education Through Distance Mode: Option or compulsion?

Either 'choice' or 'compulsion' - may be the two distinct driving forces due to which an individual may proceed to any activity *(Anastasi, 1988)*. It is true even when the question of pursuing a course is taken into consideration.
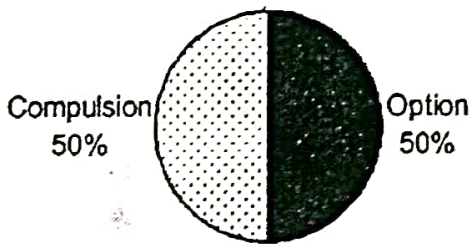
Fig. 4a: Distance mode: Option vs Compulsion

While responding towards related question, the entire group of our respondents categorically bifurcated, as depicted in Fig. 4a. While 50% of them reported that they were compelled to join the course [due to certain reason(s)], the rest of them negates the view, saying that there was no compulsion as such for them to join the course.

Therefore it may be assumed that another chunk of the respondents (50%) joined the course out of their choice, and as such, possess a 'true interest' in their study. Respondents, being the students of civil and mechanical engineering disciplines, ought to go through papers on hydraulics, which needs practical sessions on the respective content area. Having certain expectations to perform adequate practical sessions and thereby to develop skill and competency, they joined the course.
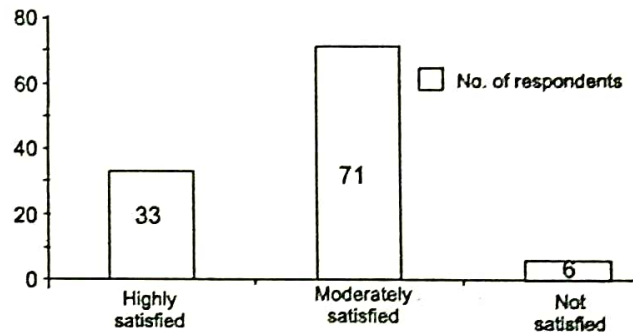
Fig. 4b: Level of satisfaction with practical sessions

After attending the course, while responding towards another question, it was observed that around 30% of the respondents perceived that their institutions arranged a lot for practical sessions to develop required skill, whereas majority (65%) opines that the scope extended by the institutions is of a 'moderate level' as depicted in Fig. 4b. Though less, however almost 5% of the respondents were not satisfied with the very scope and to them, the scope is 'not up to the level of expectation'

As it appears, this third group of respondents either may possess a higher level of expectation from the very course, or may be unable to decode the instruction delivered to them.

This finding further reveals that institution, where our respondents are enrolled,

are making effort to minimize the drawbacks of distance mode of instruction by arranging appropriate contact sessions.

4.5 Comparison of Convectional Courses and the Distance Mode

It is crystal clear from the pattern of response from the respondents that distance mode is considered a better option by sizable proportion of the respondents.
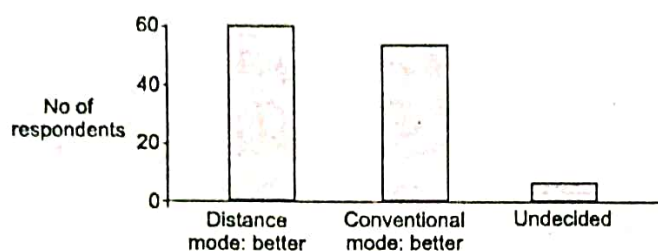
Fig. 5: Comparision of Conventional and Distance mode

So far as the response pattern reveals, shown in Fig. 5, as many as 50% of the respondents considered that compared to conventional mode of instruction, distance mode of instruction is better option for gaining knowledge and skill. However another fraction of the respondent group, comprising 45% of the respondents opposed the view. though such response-pattern does not justify those conventional methods of instruction as 'better than that of distance mode'. Rather the view expressed by the group only opposes the stated view in the question. Very few respondents (5%) did not respond towards the very issue.

Expenditure on Distance Education

Responding towards a similar type of question, 50% of the respondents reported that in terms of course-fees, distance mode of instruction is a better option compared to conventional mode of instruction as depicted in Fig. 6.
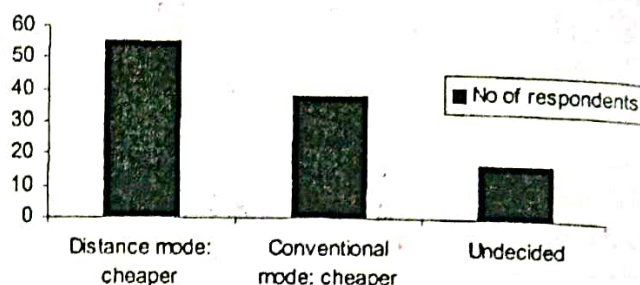
Fig. 6: Expenditure of Distance Education

However 35% of the respondents negate the view; this second group perceives that, even today, the expenditure involved in conventional mode of instructions is much lesser than that of distance mode. Probably this group, while making the comparison, considered the course-fees, charged only by the government-funded colleges and institutes and as such, considered that distance mode of instruction 'a much expensive one'. Almost one-seventh (15%) of the respondents avoided the question.

Economic Status of the Respondents

Any course, especially in engineering discipline, if arranged by any non-government organizations, it is assumed that the course should incur some sizable financial expenditure towards the learner. With a view to explore the economic status of the respondents, reflective question was also designed and the very question was placed to the respondents.

Response pattern, as depicted in Fig 7, indicates that almost 39% of the respondents say that the course, though offered in distance mode, however is quite expensive to them. On the other hand, majority of the respondents (56%) opined that the expenditure involved in the course is quite justified. Only 5% of the respondents report that the course appears as a 'subsidized one' to them.

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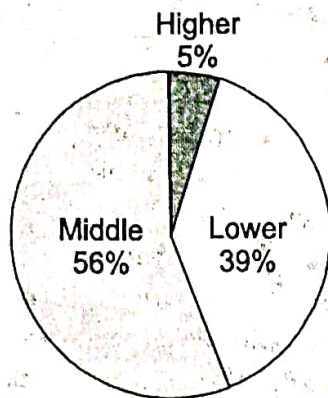
Fig. 7: Economic status of the respondents

It reveals that this marginal group belongs to the higher economic status. The very finding justify that it is mostly the people, who belongs to middle economic status, are proceeding for distance mode of instruction at the very level of education.

Distance mode of Education for Enhancing Educational Qualification

While responding towards a question, grand majority of the respondents (82%) reported that distance mode of instruction is obviously a better option to enhance individuals' educational qualifications, as shown in Fig.8
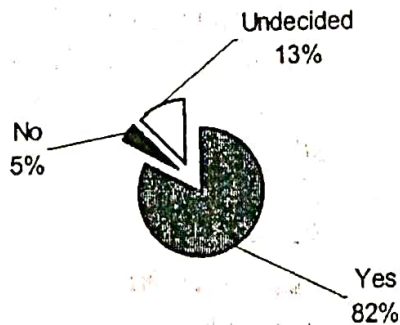
Fig.8: Distance mode: Whether just for enhancing educational qualificaiton

The very view was negated by just only 5% of our respondent group. Around 13% of the respondents did not express their views towards the very issue. The finding goes in consonance with the preconceived notion of the mainstream, which holds distance mode of education as an easier alternative to be 'highly educated'.

4.9 Career Development Through Distance Education

As the study reveals, 93% of the respondents expect that the course they are attending through distance mode, will be helpful for them in terms of their career development, as it is depicted in Fig. 9a.
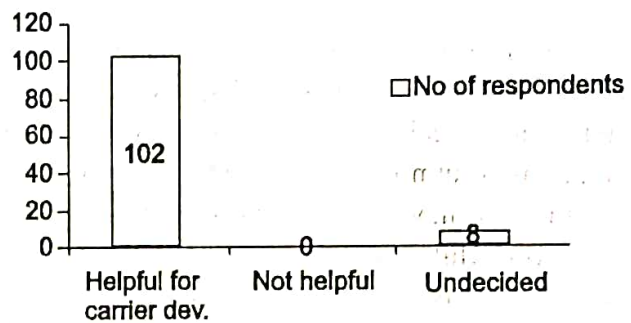
Fig. 9a: Carrier development through Distance Education
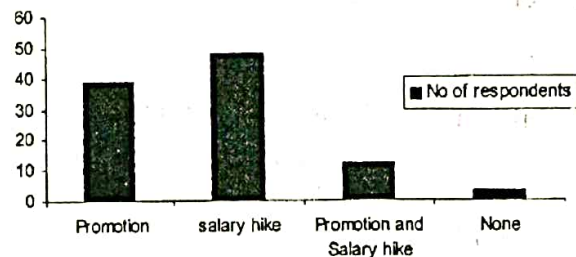
Fig 9b: Distance mode: Knowledge impact

However among those who holds that the course will be helpful for them in terms of their career development, 12% of those respondents reports that they expect that the course will help them in the path of career development in terms of promotion and salary-hike. Only 47% of the respondents expect only salary hike and 38% expect only promotion may be extended to them after completion of the course and thus they will be benefited from the course in terms of career development.

5.0 Post – Script

With a view to enhance the educational qualification as well as to update the subject-specific knowledge of the middle level on-line engineers, it is essential for the planners and implementers of technical education system to arrange appropriate alternative scope so that those who are in job or in service in middle-cadre of engineering services can also contribute their experience for the acceleration of the development of the nation.

Once the function of technical education is to evolve a skilled cadre of technical education specialists, such courses on distance mode is of utmost value at the present juncture of time. It may be observed that for producing a worthwhile technician in this age of technological advancement, the 'education-component' is more vital than that of 'training-component'. Therefore, while developing curriculum or course for the working engineers, emphasis should be given much over the technical studies, with an applied slant. For them, studies of subject specific topics like hydraulics, Mechatronics, electronic devices, web learning, chemical engineering unit operations like mass-transfer or mechanical-operation, heat transfer, etc. should be more emphasized than that of acquiring crash-skill. How to put a brick on brick has no value in technician education or technological education as s/he will never be a massion or brick layer, but s/he must know why a brick is placed upon another in a particular fashion and what are the consequences, if there is a deviation from normal practice. For a middle-level working-engineer, development of *manipulative coordination* is more important than *manipulative skill* and distance mode of instruction is capable enough to develop such manipulative coordination, if offered in a serious fashion, supplemented by contact sessions.

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Analysis of Non Formal Programmes for Persons with Disabilities – A Curriculum Development Perspective

B.G. BARKI and S. RENUKADEVI

Introduction

The Persons with Disabilities Act 1995 and the subsequent launching of the Centrally Sponsored Scheme for Integrating Persons with Disabilities in to the Main Stream of Technical and Vocational Education by upgrading selected Polytechnics is a landmark step in terms of improving the quality of life of Disabled Persons.

Technical and Vocational Education is a key element in promoting the welfare of the Differently Abled. This sector of education is the most important in improving the life of the Diffrently Abled.

This article gives an overview of the various modes of training the disabled and concentrates on the analysis of the various Non-Formal programmes offered by the polytechnics, so that a comprehensive curricular and instructional material development process can be set in motion.

Formal and Non Formal Programmes

The PWD Scheme is being implemented in the 9 Polytechnics in the Southern Region. The polytechnics have been organizing formal and non formal programmes. A large number of PWDs have seen assisted through this scheme for improving the socio-economic conditions and combating social discrimination and exclusion.

NITTTR, Chennai has provided the required guidance to the polytechnics in the Southern Region for the implementation of the project. Education modes for Disabled contains two types: Formal and Non Formal.

In the Formal mode students are admitted to the Diploma Programmes offered by the polytechnics. There is no special certificate required for PWD's but some special facilities will be required in overcoming the barriers for learning.

Polytechnics plan and offer Non Formal Programmes, so that the PWD's can acquire Technical and Vocational skills to become self dependent. Programmes under Non Formal mode should be need based.

Types of Non-formal Programmes

The 9 Project Polytechnics have been conducting Non-Formal Programmes. A survey of the various programmes that are offered and the people who benefited out of this program was analyzed.

The following table lists the programmes and the no. of trainees admitted in each programme.

Table 1. Data on Admission for Non-Formal Programmes

S. No.	Title of the Non-Formal Programme	Total
1.	Office Automation/M/S Office/ Typing & Office Automation	47
2.	Basic Computer	5
3.	Tally	5
4.	Multimedia	12
5.	Data Entry Operator	8
6.	DTP/ DTP & Screen Printing/ DTP & Computer Application	83
7.	Beautician	6
8.	Tailoring	32
9.	Tailoring and Elec. Embriodery	14
10.	Hand Embriodery	12
11.	Machine Embriodery	4
12.	Fashion Designing	5
13.	Home Made Products	10
14.	Two Wheeler Servicing	10
15.	TV Servicing & Repairs	10
16.	Electronic Hardware Servicing	10
17.	Computer H/W Maintenance	6
18.	Mobile phone repairing & servicing	12
19.	Motor Winding	5
20.	Chair caning	5
21.	Fabric painting	5
22.	Screen Printing	15
23.	Book Binding	15
24.	Phenyl, Agarbatti, Soap Making	15
25.	Paper bag and cover making	10
26.	Rexine Bag Making	5
27.	Chalk making	5
28.	Candle making	10
29.	Dress Making	5
30.	Garment Making	25
31.	Handy craft	5
	Total	416

Analysis of Data Related to Conduct of Non-formal Programmes

A total of 416 trainees have been admitted in 31 Programmes. Out of these 51% are men and 49% are women.

The following are the Findings:

➢ The Overall Employment Rate is 40%.

➢ 23% are Employed in Different Industries and 17% are Self Employed.

➢ The Employment Rate of Women is Higher than Men.

➢ The Admission Rate and Employment Rate is high for the courses, on Office Automation, Data Entry Operation, DTP & Screen Printing, Tailoring and Embriodery.

➢ However in one instance for Home Made Products the admission is more, but data on employment rate is not available.

➢ Only a few Polytechnics have framed the syllabus for the programmes like DTP, Office Automation & Garment Making.

Development of a Curricula Framework

The following aspects are to be taken in to consideration while developing the curricula for Non-Formal programmes:

➢ Employment opportunities.

➢ Competencies needed for self/wage employment.

➢ Infrastructure for conduct of programmes.

➢ Procedures for evalution.

Based on the findings it is proposed to develop a curricula framework for the following programmes:

➢ Office Automation.

➢ DTP and Screen Printing.

➢ Tailoring and Embriodery.

It is proposed to conduct a curriculam development workshop to finalize the syllabus, instructional material and evaluation procedures for the above programmes.

Conclusion

Education and training of Persons with Disabilities is a complex and a challenging task. The training of PWD's requires commitment and dedication on the part of the project polytechnic. The proposed curricula framework will help in improving the quality of the Non Formal programmes offered and will act as a guideline for future programmes.

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Early Detection of Breast Cancer - The Need and Possibilities

R. SAMSON RAVINDRAN

Abstract

In the Emerging world, the development of Science and Technology helped in the field of Medicine and Treatment for saving life. Meanwhile the complexity of managing the health care is increasing as stakeholder struggle to contain cost and improve quality of care for patients. Breast cancer has become the second leading cause of female mortality worldwide. The current five-year survival rate for women with breast cancer is 86%. In Recent days the lifestyle and lack of awareness gradually increased a woman's risk of getting breast cancer. The two main hurdies for Breast Cancer is shyness among the women and the painfulness during the diagnosis. To overcome the hurdles the early detection of breast cancer is essential. The Need of early detection is to cure the breast cancer and to increase the life span of the women. Digital Mammography is an excellent way to detect breast abnormalities. To make more effectiveness the images with pseudo coloring and digitally reconstructed one in three dimensions will help, for early detection and clear diagnosis.

Keywords: Digital Mammography, Breast Caner, Breast Imaging, Image processing, Pseudo-coloring, 3D Reconstruction, Mammograms.

Introduction

Breast Cancer can be checked treated and life can be saved only if it is detected in its early or very first stage. Every 3rd minute a woman is diagnosed with breast cancer and every 10th minute records a loss of life due to breast cancer. There have been enormous medical and scientific developments to help the diseased and the medical professionals in detecting the malignant tumor (breast cancer) in its first stage namely the advancement in mammography, ultrasonic x-ray and others. But the fact remains is that none of the above guarantees 100% detection of malignant tumor in its first stage. Mammography has been projected as the most accurate way of detecting breast cancer in its earlier stage but still its only 70% to 75% accurate.

What is Breast Caner?

Breast cancers are potentially life-threatening malignancies that develop in one or both breasts. The structure of the female breast is important in understanding this cancer:

➢ The interior of the female breast consists mostly of fatty and fibrous connective tissues.

➢ It is divided into about 20 sections called lobes.

➢ Each lobe is further subdivided into a collection of lobules, which are structures that contain small milkproducing glands.

➢ These glands secrete milk into a complex system on tiny ducts. The ducts

carry the milk through the breast and converge in a collecting chamber located just below the nipple.

➢ Breast cancer is either noninvasive (generally known as in situ, that is, confined to the site of origin) or invasive (spreading).

Types of Breast Cancer

There are several types of breast cancer, but the common types are ductal carcinoma (occurring in 85 - 90 percent of the cases) and lobular carcinoma (occurring in about eight percent of the cases).

Ductal carcinoma arises in the ducts (the passageway which carries milk from the milk-producing lobules to the nipple). Lobular carcinoma arises in the lobules (part of the lobe which ends in dozens of tiny bulbs that can produce milk).

Causes and Risk Factors of Breast Cancer

No one knows exactly why a normal breast cell becomes a cancerous one, and there is probably no single cause. It is thought, however, that breast cancer results from a combination of risk factors. These risk factors can be grouped into several categories like

1. Hereditary risk
2. Hormonal risk factors
3. Aging
4. Gender

A Woman's chances of Breast Cancer Increases With Age	
From age 30 to age 39	0.44% (1 in 227)
From age 40 to age 49	1.49% (1 in 67)
From age 50 to age 59	2.79% (1 in 36)
From age 60 to age 70	3.38% (1 in 26)

Source: National Cancer Institute

Symptoms of Breast Cancer

Early breast cancer usually does not cause pain. In fact, when it first develops, breast cancer may cause no symptoms at all. But as the cancer grows, it can cause these changes:

➢ a lump or thickening in the breast or armpt

➢ a change in the size or shape of the breast

➢ discharge from the nipple

➢ a change in the color or texture of the skin of the breast or areola (such as dimpling, puckering, or scaliness).

How Do Women Determine if They Are At Risk For Breast Cancer?

An array of factors, from family history and race to age at first menstruation and number of children are used to determine if a woman is at high risk of breast cancer. Answers to the following questions can help a woman and her doctor determine her risk:

1. Did you have your first period before age 12?

2. Did you have your first child after age 30?

3. Are you childless?

4. Did/does your mother have breast cancer?

5. Do you have any sisters who have had or have breast cancer?

6. Do you have any daughters who have had or have breast cancer?

7. Have you ever had a breast biopsy?

8. Did the doctor ever tell you that one of your biopsies showed a premalignant or precancerous condition?

9. Did the doctor ever tell you that one of your biopsies showed early cancer that has not spread yet?

Diagnosis of Breast Cancer

Mammography is an x-ray of the breast that reveals suspicious areas that are denser than normal breast tissue or have abnormal deposits of calcium. Mammography is an important screening test which can show a breast cancer long before it is big enough to be felt in the breast. Women over age 40 should undergo a mammogram every year in order to detect breast cancers when they are small and can be treated easily. Since mammograms have been used routinely in the United states, the death rate from breast cancer has fallen dramatically as cancers are found earlier, when they are more likely to be curable.

Mammography

Mammography is a safe, low-dose x-ray picture of the breast that allows early detection of cancer. Bozeman Deaconess now has available the latest cutting-edge advancement in mammography called Computer Aided Detection (CAD). With this technology, mammograms are first evaluated by a radiologist, and then a computer program is used to further analyze mammography data.

Digital Mammography

Digital Mammography is seen as the biggest advancement in the field of mammography in the past three decades. The tests are clearer, more accurate and twice as fast compared to other techniques. Digital Mammography allows physician to zoom in, magnify, and optimize different parts of the mammogram. Thus breast tissue may be examined more closely without having to take an additional image. The improved accuracy of digital Mammography may reduce the number of follow-up procedures.

The methodology is derived by taking two plain film (x-ray) Mammography at an angle 45 / 90 degrees, collecting the details in digital form in a computer for segmentation and reconstruction.

Identification of Normal Digital Mammograms

A Mammogram is an x-ray of the breast that can often find tumors that are too small. The accuracy of a mammogram to detect cancer will depend on such factors as the size of the tumor, the age of the person, breast density, and the skill of the radiologist. To identify the Normal Digital Mammograms:

Step 1: The Mammogram is smoothened to remove the noise.

Step 2: In the Smoothened image the background is subtracted from the image.
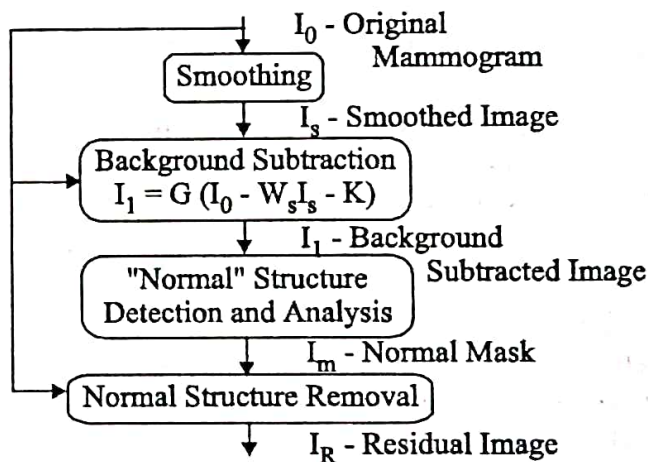
Fig. 1: Identification of Normal Digital Mammograms

Step 3: From the extracted image the Normal structure can be detected and analyzed.

Step 4: By Masking, the Normal structure is removed and the residual image is used for further processing.

Process of capturing images for Digital Mammography

Plain film Mammography of a same patient is taken in 45/90 degrees angle difference between the two images. Considerable attention is given to the problem of improving the photochemical and photoconductive systems so that they can provide optimal diagnostic in formation and at the same time decrease in the amount of radiation required. The film screen system has successfully reduced the exposure of both skin and underlying tissues to the x-ray.

Reconstruction

Digital mammography has long been touted in terms of the increased signal-to-noise ratio (SNR) of the resultant images. Yet, clinical trials of digital mammography have not shown a significant improvement in specificity, sensitivity or accuracy compared to film-screen mammography. One reason is the presence of non-quantum, non-stochastic "noise" sources; the most substantial of which is anatomic noise (the breast parenchyma). Thus, it appears that modern mammography is not limited by dose, but by the superposition of anatomic structures in the breast. Improvements in observer performance may occur if breast images can be acquired in which the breast parenchyma is suppressed. There are number of options to achieve this goal: including contrast enhanced digital mammography and imaging the breast in 3D to avoid superposition of tissue.

Normally, a woman will have two mammograms taken at different views for both of her left and right breasts. The depth information of the 3-D masses is lost in the 2-D mammographic views. The purpose of 3-D mass reconstruction is to recover the depth information, which is very important.

The Position can be detected by using two different x-ray tube positions. The shape of the tissue can be reconstructed by using two spatially separated sources producing two different images depending on the density of the observed tissue.

Position is reconstructed as intersection of projection lines for different x-ray tube angles. Shape is reconstructed by comparing the intensities in different projection images of the same calcification.

The practical plain mammography Rcc(cranio - caudal) is taken. In some different cases, we are analyzing the 45° right wards in the case of right breast and 45° leftwards in the case of left breast. This is the basis for developing algorithm for wavelet transform - Radon transform. The R_{MLO} (Medio Lateral Oblique) is also taken.

With these two available 45° separation details we have to simulate the 90°
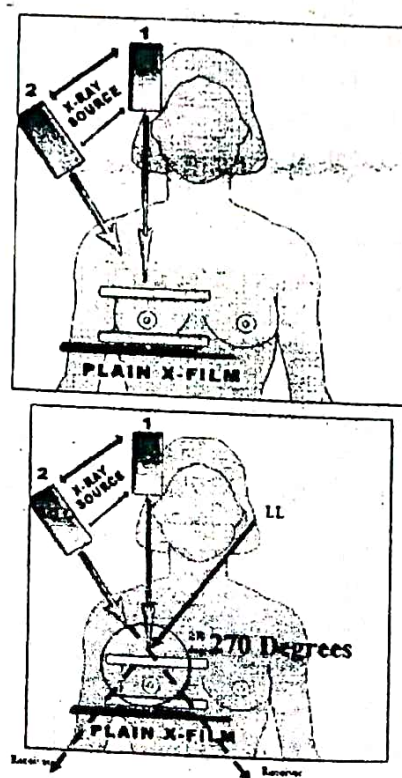
Fig. 2: X-ray position

approximation. Using this we can get 2D image. This helps more to go for 3D simulation using the transforms. We can get clear reconstruction of this digital image of the mammography in 3 dimensions.

While taking x-ray, the angle between the source MLO and the collector LL is 270 degree. It is not possible to take the x-ray above 270 degree because, the next breast will come and also it will be more painful.

Need for Pseudo Coloring

Pseudo coloring results in better identification of these calcification. The term Pseudo color refers to using color to visualize things that aren't inherently colored. If two variables of information have to be displayed at a time in an image, the intensity (one variable) and the hue (other variable) may be varied independently. Pseudo color can be effectively used to label or identify particularly significant sections of the image as determined by some other image processing or vision algorithm.

Pseudo coloring

Pseudo Coloring comprises of assigning colors to gray values based on specific criterion. The term Pseudo color or false color is used to differentiate the process of assigning colors to monochrome images from the process associated with true color images. The principle cause of using color is the fact that humans can distinguish thousands of color shades and intensities, compared to only dozens of shades of gray.

Early detection of Breast Cancer

Breat cancer can be cured consistently when detected early. Breast self-examination, regular clinical examination by health care provider along with review of risk factors and mammography are the critical tools for early detection. Breast self-examination should begin at age 20 and be done monthly. Clinical breast exams should be done at least every three years between ages 20 and 40 and every year starting at age 40. Mammography should be done first at age 40 and every year or two years until age 50 after which it should be done yearly until at least age 65. Women with more than average risk of breast cancer need to work with their health care provider to develop a more aggressive early detection strategy.

Conclusion

We have found that the 3-D mammographic breast imaging techniques have potentials for both early cancer detection and diagnosis. The 3-D images of the breast reduce the likelihood of the superposition errors and improve the separation of overlying tissues. This reconstruction also has an advantage of reducing the amount of data needed. The 3D reconstruction enables to find the shape and locations of the calcification, for a clear detection.

Future Work

Instead, of using Vertical machines we can use Horizontal machines. In the Existing system we can take 3 shape and the radiation is 2.5 MGY. In the proposed system from the source to the receiver (IR Camera) we can take 6 snaps as top 3 snaps (MLO, LL, CC) and bottom 3 snaps (MLO, LL, CC) with radiation less than 2.5 MGY. BY using horizontal machines we can capture image in the bottom. Also taking the image and storing it directly in the system in digital form with high resolution will help in calcification and diagnosing the breast cancer.

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Removal of Fluoride from Water by Adsorption onto Gamma Alumina, Bauxite, Cerium Hydrate and Lanthanum Oxide – An Investigation

C.R. NAGENDRA RAO and J.KARTHIKEYAN

Abstract

The problems of excess fluoride in drinking water is prevalent in many parts of the world of India. A technology appropriate to rural and isolated communities is yet to be developed. Bauxite, is found abundantly but is under exploited for defluoridation purposes. Similarly, Rare Earth materials, which are actually not rare but available in abundance in countries like China and India, need to be investigated for application in water treatment specifically for defluoridation. Therefore an investigative study was conducted employing the above material *vis.*, Bauxite, Cerium hydrate, Lanthanum oxide and also highly potent gamma alumina for use for as an effective adsorbent for removal of fluoride from water with a fluoride concentration of 4 mg Litre^{-1}. The present paper discusses the significant results and inferences of the above investigation.

Key words: Fluoride, Drinking water, Bauxite, Lanthanum oxide and Cerium hydrate and gamma Alumina, adsorption, cations, anions, desorption.

Introduction

Fluorides can prove beneficial or detrimental to health depending upon concentration and total amount ingested. Concentrations of fluoride in drinking water upto 1.0-1.5 mg L^{-1} is beneficial, especially, for young children as it helps calcification of dental enamel, whereas fluoride in excess quantities and doses may cause dental and/or skeletal fluorosis (Paul and George, 1978). Bureau of Indian Standards for drinking water recommend a desirable limit 1.0 mg. L^{-1} and a permissible limit of 1.5 mg L^{-1}. The problems of excess fluoride in drinking water are prevalent in many parts of India. Occurrence of fluoride bearing waters in Andra Pradesh, Rajasthan, Punjab, Haryana, Uttar Pradesh, Madhya Pradesh, Gujarat, Maharastra and Tamilnadu was well documented by many researchers (Nawlakhe, *et.al.*, 1975)

Under-exploited, abundantly available, highly potent materials like gamma alumina, Bauxite, Lanthanum oxide and Cerium hydrate were investigated to find their adsorptive capacities for removal of fluoride from drinking water (Nagendra Rao, 2004). For this, batch adsorption experiments were conducted to investigate kinetics and equilibrium of adsorption process, effect of other ions, etc. and the results are presented herein.

Materials and Methods

The gamma alumina, used as a adsorbent, was obtained from the Electroplating Division of BHEL, Bangalore, India. The material received was in the form of fine crystals.

The bauxite mineral was obtained from MALCO, Mettur, Tamilnadu. The material received was in the form of granules. The size of the particle was observed to be very unstable and decreased during experimentation as the particles disintegrated. Hence, in order to have a material of uniform size with insignificant change in particle size, the bauxite was ground to fine size and that fraction passing through 90 μm sieve was used throughout the experimentation.

Lanthanum oxide and Cerium hydrate extracted from Monazite mineral was obtained from Indian Rare Earth Ltd, Udyogamandal, Kerala, India. The material received was in the form of fine powder with grain size of < 5 microns. The material, as received, was used for entire experimental work.

Standard fluoride adsorbate solutions were prepared by dissolving appropriate amount of Sodium Fluoride (NaF) in distilled water. A stock solution of 100 mg L^{-1} fluoride was first prepared and all working solutions were prepared by appropriate dilution of freshly prepared stock solution with distilled water (pH 6.50 - 6.80). All experiments were conducted at room temperature (26 – 30°C).

A SYSTRONICS — 105 Spectrophotometer was used for analysis of fluoride concentration using SPADNS method, outlined in 'Standard Methods for Examination of Water and Wastewater (APHA, AWWA, WEF,1995).

Results:

Batch adsorption experiments employing the above materials and test fluoride solution indicated good uptake of fluoride by Lanthanum oxide, Cerium hydrate and gamma Alumina and poor uptake by Bauxite. Hence Bauxite was subjected to acid treatment with hydrochloric acid and the acid treated Bauxite exhibited good uptake. It follows from the batch adsorption experimental results that of all the adsorbents, Cerium hydrate exhibited highest potential for fluoride removal and is followed by Lanthanum oxide, gamma Alumina and treated Bauxide.

Detailed experiments like adsorption kinetics, equilibrium adsorption, influence of pH, influence of anions, desorption, interruption and regeneration studies and up-flow column studies were conducted and the results are discussed in the proceeding paragraphs.

Adsorption was independent of system pH in the range of 3.0 to 8.0 i.e., the pH of the solution has insignificant effect on adsorption in the pH range of 3.0 to 8.0. This indicates a good potential of the adsorbents for field application. However, adsorption decreased beyond pH 9.0. The pH-sorption edges were typical of anionic sorption with sorption decreasing dramatically at high pH i.e., at pH above 9.0.

The percentage of removal of fluoride increased with an increase in the dose of all the adsorbents with 100% removal achieved by Cerium hydrate at a dosage of 4 gL^{-1}; however, in all the cases, the uptake of fluoride i.e., mg of fluoride adsorbed per gram of adsorbent decreased with increase in the adsorbent dose.

Study of kinetics of adsorption indicated that the adsorption process proceeded quite rapid initially and attained equilibrium gradually. Adsorption kinetic data fitted well to the pseudo second order model. Further processing of kinetic data suggested pore diffusion to be rate limiting though some film diffusion might occur overcoming the

resistance offered by boundary layer because of agitation.

Isothermal equilibrium data of all the adsorbents except treated Bauxite fitted well into the BET model. It may therefore be inferred to be adsorption onto a heterogeneous surface and results in formation of multilayer. From the data of adsorption capacity and intensity, the order of adsorption is as follows: Cerium hydrate > Lanthanum oxide > gamma Alumina > Treated Bauxite. From the equilibrium data empirical isotherm models were obtained and are presented in the text.

Isothermal equilibrium adsorption curve (saturation curve) of Bauxite conforms to Type I of BET classification, which is of the type Langmuir, representing an adsorption that presumably corresponds to a complete monolayer. Saturation curves of the remaining sorbents conform to Type IV, which are considered to reflect capillary condensation phenomenon in that they level off before the saturation is reached and may show hysteresis and specifically refer to porous solids.

Desorption studies are useful in elucidation of the mechanism of adsorption reaction and the amount of desorption provides an insight into the nature of adsorbent-adsorbate bonding and also of the ion-exchange property of adsorbent. Desorption studies conducted employing distilled water revealed insignificant desorption. The order of desorption of fluoride is (Cerium Hydrate and gamma Alumina) > treated Bauxite > Lanthanum oxide. The results of desorption studies further indicated that adsorption of the fluoride is irreversible in nature with interaction of the type leading to chemisorption occurring between the fluoride and the adsorbent surface.

In order to probe into the nature of the adsorptive uptake of fluoride by various sorbents under study, interruption studies were conducted by interrupting the process of adsorption. Results of interruption tests indicate pore diffusion to be the rate limiting in the adsorption process.

Cyclic regeneration studies were conducted using 1% Alum solution and it follows from these studies that all the adsorbents under study could be regenerated for 10 cycles before the residual fluoride reaching $1.5 mgl^{-1}$.

To investigate the engineering design aspects like contact time and operating capacity, up flow colum studies were conducted using Perspex (polymethyl methacrylate) column of 39 mm internal diameter having appropriate inlet and outlet arrangements. Fine size of the particles prevented down flow pattern. Three different weights of sorbents and three different linear flow velocities were used and the columns were run to exhaustion. Rate of appearance and breakthrough profile were recorded and the data fitted in to appropriate mass transfer models.

In a real field environment, a wide variety of anions like chlorides, carbonates, bicarbonates and sulphate may be present in aqueous phase in association with floridians. The studies on the effect of anions like SO_4^{-2}, Cl^-, HCO_3^- on the adsorption of fluoride by various adsorbents revealed that Chlorides, Sulphate and Bicarbonates influenced fluoride uptake beyond concentration of 500 mg of chlorides/L, 150 mg of Sulphate/L and 50 mg of bicarbonates/L.

Pure i.e., unloaded Treated Bauxite, Cerium hydrate, Lanthanum oxide, gamma Alumina and loaded adsorbents were subjected

to powder X-Ray diffraction (XRD) analysis. The X-Ray diffraction patterns of loaded sorbents exhibited some variations possibly due to Fluoride sorption.

Inferences

From the above studies some key inferences were drawn like of all the sorbents studied Cerium hydrate exhibited the most rapid uptake and also maximum extent of uptake of fluoride followed by gamma Alumina, Lanthanum oxide and Treated Bauxite. The sorption interaction followed a pseudo second order reaction and adsorption interaction was instantaneous and of the type Chemisorption with pore diffusion to be rate limiting. In the normal range of drinking water pH encountered, adsportive uptake of fluoride was not affected by pH of the water.

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A Dilemma in the Leadership Attitude Study Among the Senior Division NCC Officers

S. SIVAPATHASEKARAN

The identity and role of NCC Officers.

A full time lecturer/librarian/physical director under 35 years of age associated with law medicine, engineering, arts and science and polytechnic colleges of various academic disciplines are eligible to be the NCC Officers, of course, with a stipulated legal and health conditions. National Cadet Corps in India, is the world largest youth development organization, offering training to more than twenty millions of school and college students annually with a military line precision. Tamilnadu, Andaman and Pondichery directorate is one of the 16 directorates engaged in this yeomen service. The eligible individual has to undergo three months pre-commissioning training. At the end of this they are awarded with lieutenant rank and class one gazetted officer rank.

They have to take care of the institutional training and take part in various adventure and competitive training camps in the state and national level. To impart this they have to be in liaison with the students, department of his origin, whole of his institution, parents, various government agencies alongside the NCC Organisation which is directly under the control of Ministry of Defence. Subsequent courses and training will elevate him to the rank of captain and major in a span of 15 years. He is assisted in the training by military instructors and the rest of his office is completely managed by him.

Need and Importance of the study

Some form of planning and vision is essential to succeed as leader. If the leader is not constantly surveying the terrain ahead, the leader and follower can often find themselves in a situation where every thing will go as a total waste. The problem for any leader is the difficulty of foreseeing the future. As Chinese have very wisely stated "To prophesy is very difficult, especially concerning the future". It is important that a leader has to constantly survey the organization for its attitudes and feelings of its members. Chiris Arigiris of Hardward University pointed out that, in his 25 years of research work in management and leadership he had discovered that the single biggest weakness of most leaders and managers was that they spent too much time in doing and not enough time for thinking about what they are doing. Many times the remedy for having lost sight of vision of the organization is to increase the efforts and drive the herd forward. This inevitably leads to disaster. It is important that any leadership enterprise if it is to be successful, establish early a strategic planning process that monitors the environment, considers the strengths of the organization members, devises plans to be accomplished and creates structure and

climate that will support the achievement of those plans National cadet corps is the largest youth development organization in the world which trains more than 20 lakhs of young boys and girls to become future leaders, in India. Tamilnadu directorate is one of the 16 directorates in the country which is responsible for more than one lakh such trainees coming under 270 colleges and 1675 schools.

Being the part of this directorate team, the close observation for the past 17 years have made me to conclude that the end result of shaping the youth into successful leaders, has produced very little impact. Of course the government, families, Academic institutions and the peers groups involvement have to be accounted, But it is the NCC officer who is the vital link between the youthful cadets and the rest of the systems. It is sure enough to say that a study on the leadership of NCC officers, specially the college officers of Tamilnadu, will throw insight to improve the results on the achievement on the aims of National Cadet Corps. It is planned to conduct research study in depth with the senior division NCC officers of the college level in Tamilnadu, Pondicherry, and Andhaman, which may be totally 300 in number.

Leader have a vision of what to do speak eloquently on this vision, point out the direction and sets the pace for the followers. To make others as leaders, you have to be a leader. To influence others you let them influence you. To change your followers you must accept them as they are. And finally you get what you give away. These are irrational principles, but to change the world, at first we have to change the one part of the world on which we have most control over-that is self. Then it is possible to start the revolution with external repercussions.

Training activities

"When planning for a year, sow paddy. When planning for a decade, plant trees. When planning for a life-time, nurture the young". NCC training activities have undergone a sea change from their inception to the present day. From drill and weapon training in the beginning, the spectrum of activities has expanded considerably, to keep pace with the modern needs of building the overall personality of the youth and preparing them for taking on serious responsibilities towards the community and the nation. The activities are broadly divided into four distinct categories, namely, Institutional Training, Community Development Programmes cum Social Service Activities, Activities, Adventure and Sports Training, and Youth Exchange programme.

Institutional training

Institutional training covers essential aspects of basic military training in the Army, Navy or Air Force. The aim of this training is to expose the youth to the desirable traits of a good citizen. Institutional training is carried out at two levels, in the respective educational institutions under the supervision of the permanent instructor (PI) staff/ANOs and through Training Camps.

Inculcating The Values Of The Regimental Way Of Life Through Unit Level Training

Since the NCC is partly a feeder for entry of cadets into the Defence Forces, the training syllabus at unit level endeavors to expose young cadets to a "regimental way of life", which is essential for inculcating the values of discipline, dutifulness, punctuality, orderliness, respect for rightful authority, correct work ethos and self confidence. The training also aims to generate interest in the

young cadets by providing an element of thrill and excitement. The bulk of the training activity pertains to services specific subjects of the Army, Navy and Air Force.

Developing Qualities Of Character And Leadership Through Camp Training

Camp training plays an important role in giving the young boys and girls the thrill and joy of outdoor life. More importantly, it helps to develop qualities of character and leadership, through activities involving teamwork and group dynamics. At the culmination of each camp, the increase in the level of self-confidence in the cadets is quite visible. Yet another by-product of camp training is the enhanced degree of self-reliance, which the cadets acquire.

The various camps conducted in the NCC fall into two categories, viz. state level and centrally organized camps. State level camps called Annual Training Camps (ATC), are held annually within the state, under the aegis of the respective NCC Directorates, for a duration of 12 days for Senior Division boys and girls and 10 days for junior Division boys and girls. Centrally organized camps are conducted as All India Camps and are of various types, such as Thal Sainik Camp (TSC) for Army cadets, Advance Leadership Camp (ALU), Vayu Sainik Camp for Air Force cadets and Nau Sainik Camp for Naval.

There are also a number of National Integration Camps (NIC) held under the aegis of selected Directorates, spread over the country with the aim of increasing awareness and understanding about the diverse cultures of the different states and forging unity amongst the youth.

The problems of NCC Officers

Today nobody is willing to accept the post of NCC Officer in the colleges, or at least they have a reluctant attitude toward this post. The Problems for them are of multi-faceted. Their curriculum development, departmental affairs, institutional co-operation, ability to motivate the students, to maintain the physical capability, to visit various places for the above said training programmes, and to stay away from the family, the language, culture food habits, and ego states have very clearly made them to shun and stay away from accepting this responsibilities.

Conclusion

An analysis of the role of NCC officers indicates a reluctance in their acceptance of the post of NCC officers. Hence a research study is proposed to study the leadership attitude of NCC officers of Tamilnadu, Andaman & Nicobar & Pondicherry.

A New Approach for Morphological Reconstruction of Semantic Layers in Map Images

P. RAVIRAJ and M.Y. SANAVULLAH

Abstract

Map images are composed of semantic layers depicted in arbitary colour. Often images require separation into layers for storage and processing. Separation results in severe artifacts because of layer overlapping. In the current work, we design the technique to restore semantic layers after separation. The designed restoration , technique alleviates compression deficiency of reconstructed layers versus corrupted ones with lossless compression algorithms (ITU Group 4, PNG, JBIG and IBIG2 with optimized context templates), and provides better visual quality of images in operations with selective layer removal / extraction.

1. Introduction

1.1 Digital Spatial Libraries

Real-time cartography imaging applications provide user with the view of geographic map for the area surrounding the user's location. The geographical map image is obtained from Digital Spatial Library and transmitted via network to user's mobile device such as pocket computer (PDA) or a mobile phone. Digital Spatial Library is an electronic archive of geographic imagery data[1,2]. The images forming the archive are the colour (or grayscale) raster images or multi-layer map images. The multi-layer map images consist of the set of semantic layers, each containing the data with distinct semantic content, e.g. roads, elevation lines, state

Combined map image and its layers
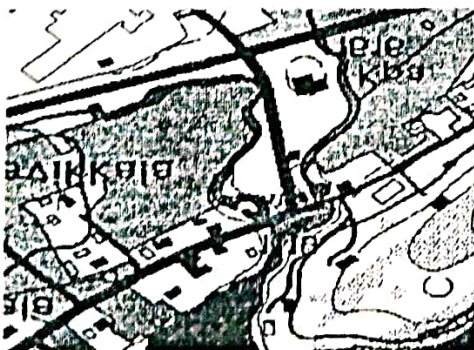
1. Basic   2. Elevation Lines

3. Waters   4. Fields

Fig.1: Illustration of a multi-layer map image from NLS Topographic database

boundaries, water areas, etc. The layers are combined and displayed to the user as a generated colour image, in which the data of each type is usually depicted using its own colour (See Figure 1).

The main problem of DSL is the huge storage size of the images. Especially it is apparent in applications requiring the use of mobile hardware such as mobile phones or pocket computers. Even though during the last decade the technology demonstrated significant progress in the development of hardware, mobile devices are still hardly restricted in memory and computational resources. Another problem resultant of large image sizes in that larger image size takes longer to transmit and/or require faster (expensive) transmission channels as well as

appropriate hardware equipment. The use of compression for saving storage space is therefore obvious. It has been shown that the best compression results for the map images can be achieved if the images are decomposed into binary semantic layers, which are consequently compressed by the algorithm designed to handle binary data (e.g. JBIG)[3,4] (see Figure 2).

In this paper we present a technique to restore semantic layers resulting from decomposition of the map image using colour separation process. The main restriction for that technique is that once combined reconstructed layers from the map image is identical to the original. Restoration technique is expected to provide better compression performance for reconstructed layers than for

Fig. 2: Operation on multi-layer map images.
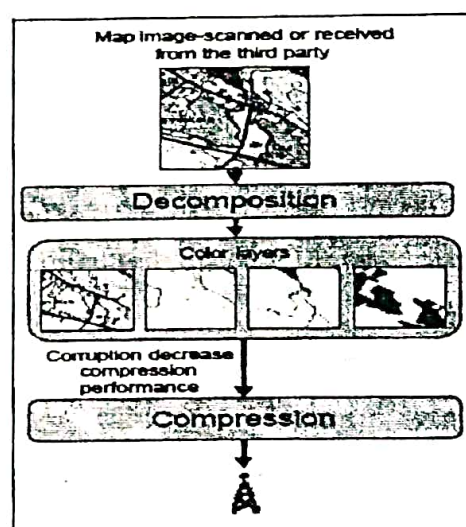
Fig. 3: Operation on map images using colour separation.

| Elevation lines layer | Waters layer | Fields layer |
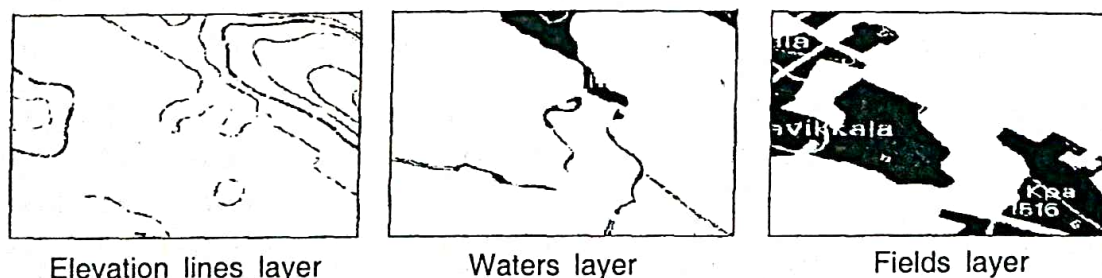
Fig. 4: Corrupted layers after separation

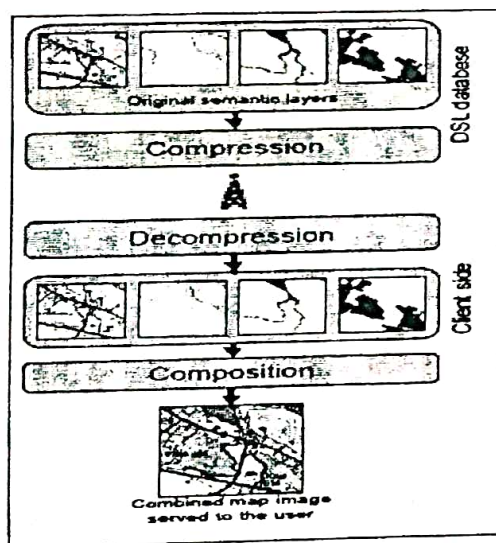corrupted ones when using popular compression algorithms (ITU Group 4, PNG, and JBIG). Reconstructed layers have to perform good visual appearance, which is useful for removal or extraction of layers from the original map image for further processing.

When designing algorithms for use in real-time cartography, one should take into account the capabilities of modern mobile devices. Therefore the complexity and memory requirements of the algorithms must be as less as possible to make algorithm applicable. Thus we decided to avoid too complicated techniques of restoration and chose Mathematical Morphology as a base tool to construct our restoration technique. The standard (so called 'crisp') morphology has been also extended to 'soft' morphology, which is more tolerant to noise and has advantages in image filtering[5].

2. Mathematical morphology – the background

Mathematical morphology refers to a branch of nonlinear image processing and analysis developed initially by Georges Matheron [6] and Jean Serra [7] that concentrates on the geometric structure within an image. The main idea is to analyze the shapes of objects in an image by "probing" the image with a small geometric template (e.g. line segment, disc, square) known as the structuring element. The choice of the appropriate structuring element strongly depends on the particular application at hand.

Basic definitions

Consider E is an Abel group and $E = E^d$ is the d-dimensional product $E X ... X E$. We denote by $P(E)$ the power set of E comprising all subsets of E.

In case of discrete binary images E is defined as $E = Z^2$ and binary image X – as a set $X E Í$:

$$X = \{ z \mid f(Z) = 1, z = (i,j) \in Z^2 \}$$

The function f is called characteristic function of X. For a set $A E \subseteq$ and element $h E \in$ we define the translate of A along the vector h as $^4h = \{ a + h \mid a \in A \}$. Operator $\Psi : P(E) \rightarrow P(E)$ is called morphological operator if it is increasing

(if $X \subseteq Y \Rightarrow \Psi(X) \subseteq \Psi(Y)$, for $X, Y \in P(E)$) and translation invariant, $(\Psi(X_h) = [\Psi(X)]_h$, for $\forall X, h)$

3. Layer reconstruction technique

3.1 The base restoration algorithm

The task of restoration consists of three stages. First we decompose the combined map image into a set of corrupted layers. Then, for every corrupted layer, the conditioning mask is created. Conditioning mask defines the area where the restoration of layer could be performed keeping the combination of restored layers untouched. Mask is defined with respect to the assumption that layers in multi-layer map are combined one over another in a predefined order. For example, we can expect that Waters and Field layers could not overlap in reality, and therefore could not overlap on a combined map image. So, when implementing, we can exclude that kind of layers from the conditioning mask (see Figure 5).

After the conditioning mask is created, the actual reconstruction of the layer is performed. The restoration is performed using conditional dilation with mask erosion operator. This operator establishes the following interactive process:
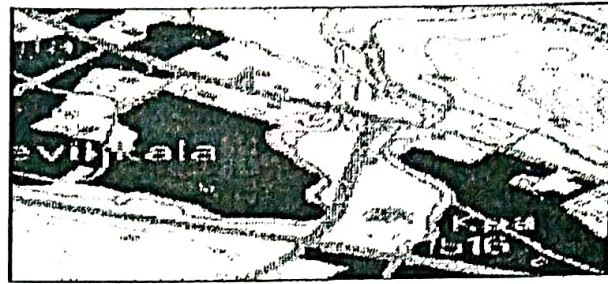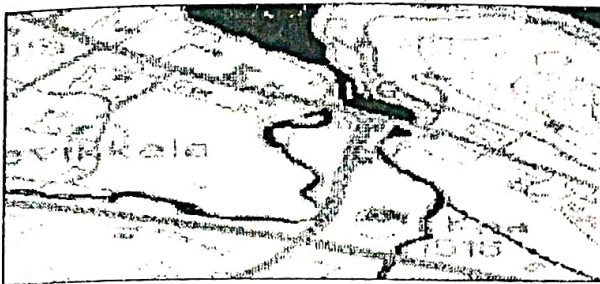
Water and its mask · Fields and its mask

Figure 5: Waters and Fields with a mask. Objects are black, mask is in light colour and background is white.

Repeat	
Layer = Dilate (Layer, Mask)	$L = \delta_A (L \setminus M)$
Mask = Erode (Mask)	$M = \varepsilon_B (M)$
Mask = Union (Mask, Layer)	$M = L \cup M$
Until Restoration is complete	

Fig. 6: Dilation with mask erosion algorithm

The erosion of a mask is applied in order to avoid disadvantages of standard conditional dilation, such as creation of artifacts on the borders of objects which corrupt visual appearance and statistical consistency. Figure 6 illustrates the algorithm.

Compared results of application of conditional dilation with mask erosion operator for Waters and Fields layers with original layers are presented on Figure 7. You can see that restoration significantly improves the consistency and visual appearance of objects. All inner artifacts (holes made by text and other symbols) were completely filled. Borders of objects smoothed and became more natural. Restored layer is very close visually to the original.

Algorithm modifications

Different layers have different morphological structure. Therefore reconstruction operator has to be "tuned" for every layer in order to achieve better performance. Parameters which could be modified are: the criterion controlling the amount of iterations in a process; the
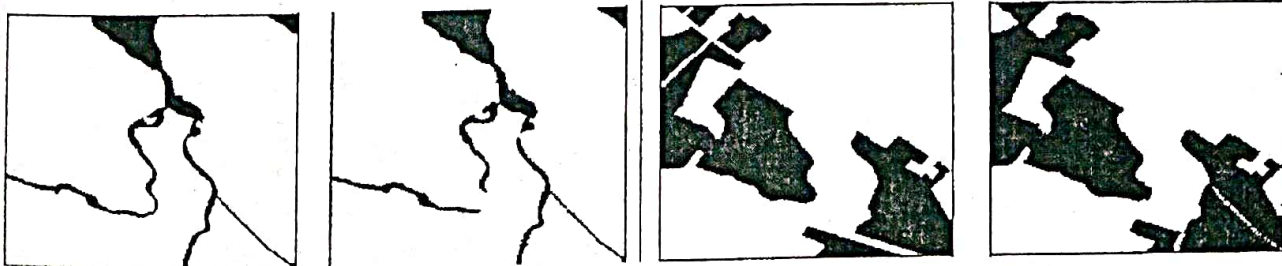
Water original · Waters reconstructed · Fields original · Fields reconstructed

Fig. 7: Waters and Fields layers reconstructed with dilation with mask erosion operator

structuring element of erosion and dilation operator; dilation and erosion operators could be replaced by other (similar) operators (e.g. soft dilation and erosion). Besides that, so called "smoothing approach" (an operator which "smoothes" objects borders in order to improve visual appearance) was considered. Modifications are briefly discussed below.

3.2 Criterion of iterations

Criterion of iterations determines how long interactive process should be performed. There are two approaches: Iterate until stability and Iterate fixed amount of times. For example, if average artifact size is 4 pixels, then we can be sure that 2 or 3 dilations with block 3×3 are enough for restoration.

Using alternative structuring elements

There are two structuring elements in our algorithm: in objects dilation and in mask erosion. By changing the first element we can control how fast objects expand over the mask. Changing of the second allows controlling how fast mask shrinks. Essential thing also is the relation between speeds of dilation and erosion.

Using soft erosion and dilation

Dilation and erosion operators could be replaced with their soft counterparts. They are relaxed versions of their crisp analogues, and therefore can manage with objects and mask

more smoothly. Also, by varying the factor parameter of soft dilation and erosion we can control the speed of expanding and shrinking.

Smoothing approach

Waters and fields typically do not have sharp edges or thin, one or two-pixel details. Therefore, we can have designed particular morphological operator to smooth borders of objects.

Combined approach

Combined algorithm is the algorithm, where Elevation and Fields layer is reconstructed with smooth modification and Waters layer – with soft modification.

3.3 Removing a single layer from the map

The task of restoration of layers arises also when there is a need for removing a layer (or several layers) from a map. For example some less important layers, like e.g. elevation lines could be unnecessary to the map user driving a car, moreover they can make difficulties for reading a map. It is impossible just to remove that layer because of artifacts it leaves on under-laying layers. Therefore, the restoration technique should be applied to all layers below the one to be removed. Figure 8 illustrates the effect of the removing of Elevation layer.

Original map   Map with elevation lines removed
Figure 8: Removing elevation lines

4. Evaluation

4.1 Objectives of evaluation

The restoration technique has been evaluated on a set of topographic colour-palette map images. These map images were decomposed into binary layers with distinctive semantic meaning identified by the pixel colour on the map. The restoration algorithm has been applied for reconstruction of these semantic layers after the map decomposition process. The objective of evaluation was to calculate the compression performance in applications where map image is compressed as a st of its binary layers. Restoration method was evaluated against three major compression techniques: LZ (PNG), ITU Group 4 (TIFF) and JBIG. For each of these compression methods we measured the compressed data size for the original semantic layers, Similarly for the corrupted binary layers after decomposition, and similarly for reconstructed binary layer using the reconstruction method.

4.2 Test set

The test set includes five randomly chosen images. Each map image is of 5000×5000 pixels and consists of four binary component layers. The layer names are following:

➢ Basic – topographic image, supplemented with communications networks, buildings, protected sites, benchmarks and administrative boundaries;

➢ Elevation – elevation lines;

➢ Water – lakes, rivers, swamps, water streams;

➢ Fields – agricultural areas.

4.3 Compression results

Here we evaluate compression results for PNG, TIFF and JBG file format s. Fourth compression technique further denoted as AKF2 is JBIG2 compression using optimized multi-layer context templates. This method optimizes the size and the ordering of pixels within the context template and provides better compression performance than standard JBIG2 [8]. The size of multi-layer context template was chosen to be 10 as in standard JBIG to maintain computational complexity of compression algorithm.

Table 1 represents the average compressed sizes of restored Water and Fields semantic, corrupted and reconstructed layers and the compression improvement presented by the restoration algorithm. Morphological structure of these layers allows to perform efficient restoration obtaining significant compression improvement (up 30-50% depending on the compression technique). Figure 9 illustrates compression improvements presented in a Table 1.

Table 2 represents the results which are the average compressed file sizes (the sum of all compressed layers; Basic, Elevation, Water and Fields) and compression rates for semantic, corrupted and reconstructed layers is calculated (0% alleviation means that reconstruction does not affect the compression rate; 100% means that reconstruction increased the compression rate back to the level presented by semantic layer). Relatively low compression improvement is caused by the dominant size of non-(such as top-level Basic layer) or hardly- (such as Elevation) restorable layers. Figure 10 illustrates alleviations of compression deficiency presented in a Table 2.

Table 1. Restoration of Water and Fields layers

Compression algorithm	Semantic layers	Corrupted layers	Reconstructed layers	
			Size	Improvement
PNG	459 036	540 039	464 971	13.90%
TIFF	192 267	406 278	194 977	52.01%
JBIG	93 686	165 752	105 964	36.07%
AKF2	55 148	89 218	64 427	27.79%

Table 2. Total compression results

Compression algorithm	Semantic layers		Corrupted layers		Reconstructed layers		
	Size	Rate	Size	Rate	Size	Rate	Alleviation
PNG	2 085 871	47.94	2 149 490	46.52	2 078 254	48.11	111.97%
TIFF	1 473 824	67.85	1 708 362	58.53	1 480 657	67.53	97.09%
JBIG	684 978	145.99	790 257	126.54	720 185	138.85	66.56%
AKF2	624 117	160.22	696 017	143.67	660 661	151.36	49.17%
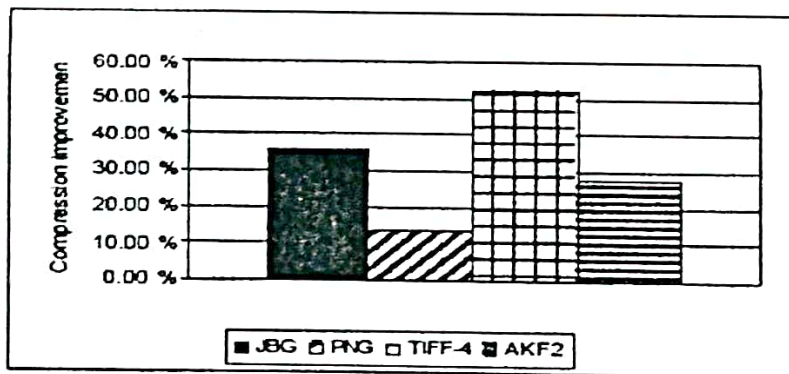
Fig 9. Compression improvement obtained by the restoration of Water and Fields layers
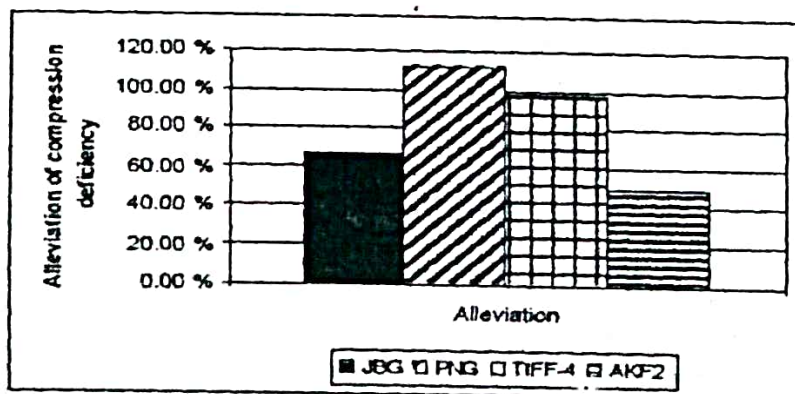
Fig 10. Compared alleviations of compression deficiency presented by restoration Algorithm

Conclusion

We proposed a technique for restoration of binary semantic layers of the map images from the corruption caused by the decomposition of the image using colour separation process. The technique alleviates the deficiency of compression up to 90–100% (for PNG and TIFF) or up to 40–60% for JBG and AKF2 compression technique. It allows obtaining up to 30–50% compression improvement for stand alone layers and improves the total compression rate (calculated for the sum of the layers) up to 5–10% depending on the compression method. Low total improvement rates are caused by the presence of non-or hardly restorable layers, such as Basics and Elevation. The colour map image resulting from the combination of the reconstructed layers remain s identical to the original because all changes to the layer content are performed only within those areas that will be certainly overlapped during the composition.

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Participants – A Key to Success of Training Programmes

P.S.RAVICHANDRAN and B.MUKHOPADHYAY

Our government formulated many rural development schemes to uplift and improve quality of life of rural community. The community polytechnic scheme is, one among them, introduced through polytechnics in India. The scheme is designed to impart skill training to the poor people to obtain new skill to be self reliant in the society. The present study is study is attempted to know the problems and benefits of the scheme.

Participation of Trainees

The success of the training scheme is pinned with the involvement of the participants and organizers. Participants may be having some prior idea about what should they learn. According to Fred Luthans, 'Social learning approach in organizational behavior suggests that people are self-aware and engage in purposeful behavior.' They must be given fair chance for expressing their needs from the training. Views of the trainee shall play pivotal role in designing the training programme. People are participating in the programme with expectation and interest to know some thing to improve their skill and knowledge. Spencer A. Rathus states that 'people are thought to learn about environment, alter and construct their environment to make reinforcers available, and note the importance of rules and symbolic processes in learning. It is imperative to find out the trainees' opinion on the effectiveness of the training programme and how this

programme is pinnacle to their life. For this purpose the study covers the following aspects.

➤ Reasons for selection of training

➤ Problems of Beneficiaries

➤ Satisfaction from current training

Methodology

The study is limited to polytechnics in Tamilnadu and the sample size of beneficiaries is 480 from 23 polytechnics during the year 2001-2002

➤ Age group in years: 15-20, 21-25, 26-30, 31-40

➤ Educational group: Iliterate, School Up to 8th std, 9th std, +2 Certificate, ITI trade, Diploma, Degree/PG,

➤ Income groups in Rs: Almost nil, Below 5000, 5000 - 10000, 10000 - 15000 15000-20000, Above 20000

➤ Earning Group in months: Almost nil. 1-3, 3-6, 6-9, 9-12

Statistical techniques

The respondents expressed their opinion on the acceptance on the reasons for selection of training in five point scale - Fully acceptable, Acceptable, Can't say, Unacceptable, Fully unacceptable.

Satisfaction from the training in which respondents participated at the time of research

(Current training) were also obtained in five point scale - Fully Satisfied, Satisfied, Can't say, Not Satisfied, Fully not Satisfied.

Hypotheses were formulated based on the demographic variables - Age, Sex, Marital Status, Education, and Income of the beneficiaries and 't' test and 'F' test were used wherever applicable.

Garrett Rank Method was used to rank the problems faced by the beneficiaries.

Reasons for Selection of training

Beneficiaries' reasons for choosing the type of training are identified and analysed with their demographic variables. The reasons are as follows:

➢ To improve the performance in present job.

➢ To remove any defects in the work.

➢ To acquire skill to be self sufficient.

➢ To improve the skill to do additional job to boost the income.

➢ To introduce new technique in their work to meet the requirement of buyers.

➢ To use in future needs.

➢ To utilize in free time.

➢ To train others.

The results of hypotheses on reasons for selection of training are presented as follows:

Age and selection of training

The hypothesis "There is no significant difference among the various age groups with respect to their average level of acceptance on reasons for selecting the training" is accepted. It is inferred that no significant difference among various age groups obtained in their average level of acceptance on reasons for selecting the training.

Sex and selection of training

The hypothesis "There is no significant difference between Male and female groups with respect to their average level of acceptance on reasons for selection of training" is accepted. It can be inferred that no significant difference is obtained between male and female groups in their average level of acceptance on reasons for selection of training.

Marital status and selection of training

The hypothesis "There is no significant difference between Married and Unmarried groups with respect to their acceptance on reasons for selection of training" is rejected. It can be inferred that significant difference is obtained between married and unmarried groups in their average level of acceptance on reasons for selection of training.

Education and Selection of Training

The hypothesis "There is no significant difference among the various educational groups with respect to their average level of acceptance on reasons for selection of training" is rejected. It can be inferred that significant difference is obtained among the various educational groups over the average level of acceptance on reasons for selection of training.

Income and Selection of training

The hypothesis "There is no significant difference among the various income groups with respect to their average level of acceptance on reasons for selection of training" is accepted. It can be inferred that no significant difference among the various income groups in their level of acceptance on reasons for selection of training.

Earning period and selection of training

The hypothesis "There is no significant difference among the various earning period groups with respect to their acceptance levels on reasons for selection of training" is rejected. It can be inferred that significant difference is obtained among the various periods of earning groups in their acceptance levels on reasons for selection of training.

In brief, martial status, education, and earning period groups showed significant differences over the acceptance level on reasons for selection of training.

Problems faced by beneficiaries

Eight problems, faced by the respondents, were identified and shown in the table A. The respondents ranked these problems from rank I to rank VIII. Table A provides the ranks with Garrett score assigned for each problem. "There is a gap between what was expected and actual content of the training offered" is considered as major problem as it secured highest Garrett score 45921. The second important problem "Self-employment after training is not available" is assigned second rank with score 45894. Third rank is assigned to "Period is not sufficient for practical" with score 45511. Fourth rank is for the problem "Computer training was not given" with 45384.

It could be observed that the respondents expected more from the training but not satisfied with actual content of the training. Further they need help in their efforts to be self employed. The latest problem is the Partiality shown by officials of community of polytechnic college.

Table A - Problems faced by beneficiaries - Garrett Score Analysis

Problems faced by Beneficiaries	N	Sum	Mean Score	Rank
There is a gap between what I expected and actual content of the training offered	480	45921	95.67	I
Marketing and accounting practice are not given	480	44619	92.96	VII
Training period is not suitable	480	44800	93.33	VI
Difficulty in transport for reaching training place	480	45121	94.00	V
Period is not sufficient for practical	480	45511	94.81	III
Self-employment after training is not available	480	45894	95.61	II
Computer training was not given	480	45384	94.55	IV
Partiality is shown by officials	480	43710	91.06	VIII

Satisfaction from the current Training

The hypotheses on satisfaction from the training were tested and results are given below.

The hypothesis, "There is no significant difference among the various age groups with respect to their average levels of satisfaction on current training" is rejected. It can be inferred that significant difference is obtained among the various age groups in their average levels of satisfaction on current training.

The hypothesis "There is no significant difference between male and female groups with respect to their average levels of satisfaction on current training" is accepted. It can be inferred that no significant difference

is obtained between male and female groups in the levels of satisfaction on current training.

The hypothesis "There is no significant difference between Married and Unmarried groups with respect to their satisfaction on current training by marital status of respondents" is accepted. It can be inferred that no significant difference is obtained between married and unmarried groups in the levels of satisfaction on current training.

The hypothesis "There is no significant difference among various educational groups with respect to their average levels of satisfaction on current training" is rejected. It can be inferred that significant difference is obtained among various educational groups in their average levels of satisfaction on current training.

The hypothesis "There is no significant difference among various income groups with respect to their average level of satisfaction on current training" is accepted. It can be inferred that no significant difference is obtained among various income groups in their average levels of satisfaction on current training.

The hypothesis "There is no significant difference among the period of earning groups with respect to their level of satisfaction on current training" is accepted. It can be inferred that no significant difference is obtained among various periods of earning groups in their average levels of satisfaction on current training.

It is observed that age, education groups showed significant difference in their level of satisfaction on current training.

Conclusion

The designing of training programme and its implementation are greatly influenced by the background of the participants. Meticulous plan is the need of the hour for the success of the scheme.

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Teachers' Perception on Non-formal Computer Education Curriculum in Tamil Nadu

K. NIRMALA and T.G. SAMBANTHAM

Introduction

Propelled by the thrust of Information Technology (IT) Policy [1], and building apt human resource base in state, Tamil Nadu (TN) continues to remain one of the best IT destinations in India. Maintaining a double-digit growth, the IT sector today provides employment to nearly 100,000 IT professionals. This has influenced the state in creating hundreds of Computer/IT job related skill development educational institutions in the state. They are mostly privately run organisations of well organized and un-organized in nature. These are in addition to Institutionalised educational organizations such as 250+ Engineering Colleges and more than 300 Arts, Science and Commerce colleges in the state. It makes TN not only the source of various knowledge professionals across India, but also the intellectual capital in the country. TN is creating a silent revolution in creating the needed talent pool for the requirements of IT/IT Enabled Services (ITES)/ Hardware industries. The requirements of ITES industries has been both by the Institionalised as well as Non-formal educational sectors.

One of the key areas, which have been addressed recently [1], is to increase the quality of human resources so as to enhance the "employability" for the ITES industry through a series of Human Resource (HR) initiatives. Most of the Non-formal IT related educational institutes in the state offer Computer subjects such as Basics of Computers and IT (BCIT), Web Technology, Management Information Systems (MIS), MicroSoft Office (MS O) and E_Commerce, which are related to ITES. Govt. of India [2], has circulated to various technical institutes under its purview, to study the level of competencies in such institutes. It is found that the existing curricula of these institutes do not include components related to their main educational objectives [2].

This paper hence attempts to make a survey to obtain opinion in the form of feedback from teachers of these institutes on the presence of educational objectives in the Cognitive domain [3], in the curriculum components of these courses.

Competencies:

The knowledge or recalling skills are expected to give more emphasis in non-formal computer education in Tamilnadu, as the entry level student's qualifications are not fixed, due to various reasons. As even many school going students are found to be attending these courses, recalling or memorizing certain basic terminologies in these software subjects may be required to imparted in a substantial quantity. As these courses are mostly job oriented, the output from these institutions

may have to start working straight way without any additional training, in their appointed organizations. Hence "Application" skill is highly expected to be present in the curriculum, other than the recalling ability.

Apart from these expectations, the survey attempts to find the actual presence of all the skills of the Cognitive domain. The survey includes, collection of feedback in three main areas of curriculum, Viz., (i) Class room teaching, (ii) Computer Lab., practical works and (iii) Student's project works. The number of respondents, number and type of subjects offered by theses institutions in the area of ITES etc., are presented in Table 1.

Feed backs were Received from various institutions situated in various districts of Tamilnadu. Nearly feedbacks from 30 teachers were collected from these institutions, with at least one teacher from each institute. The feedback have been studied and 27 valid responses have been taken for the study. The teachers are qualified, with some having B.Sc degrees while some few were M.Sc degree holders and a few others have MCA degrees.

The questionnaires consist of feedback requests on the usage of action verbs [4] pertaining to cognitive domain in three areas, vis., (i) Day-to-day usage in the class rooms by the teachers, (ii) Usage by student's final project reports. The questionnaires themselves have examples of usage so as to give clear understanding to the respondents, the teachers. The responses (with grade marked in parenthesis) were 1. Excessively used (4); 2. Highly used 3. Fairly used (2) and 4. Rarely used (1).

The feedbacks were then fed into 'SPSS' package to obtain Mean, Median and Standard

Table 1. Details of respondents

S. No.	No. of Institutes	Region	Subjects Taught	No. of Teachers responded
1	3	Trichy	Basics of Computers and IT (BCIT), Web Technology, Management Information Systems (MIS), MicroSoft Office (MSO) and E_Commerce	4
2.	2	Madurai	Basics of Computers and IT (BCIT), Web Technology, MicroSoft Office (MSO)	4
3.	1	Dindugal	Web Technology, MicroSoft Office (MSO) and E_Commerce	4
4.	3	Karaikudi	Web Technology and MicroSoft Office (MSO)	4
5.	3	Chennai	Basics of Computers and IT (BCIT), Web Technology, Management Information Systems (MIS), MicroSoft Office (MSO) and E_Commerce	4
6.	2	Tanjore	Web Technology, MicroSoft Office (MSO) and E_Commerce	3
7.	2	Salem	Web Technology, MicroSoft Office (MSO) and E_Commerce	4
			Total	27

Deviation for the analysis. They are presented below.

Class Room Teaching:

Table 2. Feedback analysis on the responses on Class Room Teaching.

Usage	Median	Mean	Standard Deviation
Knowledge	4.00	3.5185	0.849
Comprehension	3.00	2.5926	0.844
Application	4.00	2.8857	0.944
Analysis	2.00	2.4074	0.971
Synthesis	3.00	2.4815	0.802
Evaluation	1.00	1.8148	1.0755

The standard deviation is found to be less than 1 in most of the cases except for Evaluation, which is slightly greater than 1. It is found that the basic recalling skills and application capabilities are very high as expected from any Non-formal education sectors. However, while the Comprehensive ability is found to be good which is normally found to be poor in these institutions, it is surprisingly found to be good in the synthesizing ability, which is never expected to be present in these institutions. It is also observed that the Analytical and evaluating abilities are found to be poor as expected from three Institutions. This table reveals that the teachers are highly motivated in explaining the intricacies of ITES job oriented subjects like Web Technology, MIS etc., in the class rooms, as the usage of "Synthesis" skill oriented action verbs are high along with the usual knowledge and Application skills.

Laboratory Practices:

Table 3. Feedback analysis on the responses on Lab. Practices.

Usage	Median	Mean	Standard Deviation
Knowledge	4.00	3.259	0.984
Comprehension	3.00	2.5185	0.849
Application	3.00	3.000	1.00
Analysis	3.000	2.592	1.248
Synthesis	2.00	2.222	0974
Evaluation	3.00	2.444	0.974

The standard deviation is found to be less than 1 in all cases. It is found that the basic recalling skill and Application skill are high in the case of laboratory practice.

While the "Knowledge" ability is found to be good as expected, it is surprising, to note that the abilities of Synthesis & Evaluation are also high.

In Lab practice more or less all the abilities are high. The comprehension ability is the least used in the Lab practice, which is highly found in the class room teaching.

Project Work:

Table 4. Feedback analysis on the responses on Student's Project work.

Usage	Median	Mean	Standard Deviation
Knowledge	3.00	3.296	0.823
Comprehension	3.00	2.963	0.649
Application	3.00	3.037	1.055
Analysis	3.00	2.851	0.948
Synthesis	2.00	2.259	0.902
Evaluation	2.00	2.074	0.997

The Standard Deviation is found to be less than 1 in all the cases except for the Application which is slightly greater than 1.

The ability of Analyzing and Synthesizing abilities are found to be fair in the student's project work, which is not the case with other components of the curriculum.

Concluding Remarks:

1. As expected prior to the survey, the and Comprehension competencies are found to be very high from the results.

2. The Synthesis and Comprehension competencies are unusually high in Class Room Teaching.

3. Most of the competencies are highly present in Laboratory Practices.

4. The presence of competencies decrease gradually from lower level to higher level in student's Project works.

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Thinking Styles and ICT Application of Teachers in Technical Education

PANCH. RAMALINGAM

Abstract

Teachers can think and create new learning environment. They are applying various methods and materials in classroom teaching. Teachers in technical education play a crucial role to produce technocrats so as to meet the global requirements. This study investigated preferred thinking styles of teachers in technical education and their application of Information and Communication Technologies (ICT) in teaching. The major objectives are (a) to explore the possibilities of developing preferred thinking styles of the teachers in technical education, (b) to resolve how the thinking styles help the teachers in technical education, (c) to examine how teachers in technical education differ based on their gender, age, experience in teaching who attended short term courses conducted by the National Institute of Technical Teachers Training and Research, Chennai during 2005 – 06. The required data were collected from the teachers in technical education through specially designed instruments and analysed. The study reveals that (1) the teachers in technical education are having different preferred thinking styles and having rich knowledge about ICT, (2) there is no significant relationship between thinking styles and ICT of the teachers in technical education, (3) There is no significant difference between polytechnic and engineering teachers with regard to thinking styles and application of ICT. (4) There is no significant difference between male and female teachers in Technical education with regard to thinking styles and application of ICT. (5) There is no significant difference among different age group of teachers with regard to thinking styles and application of ICT. (6) There is no significant difference among the teachers based on their experience in teaching with regard to thinking styles and application of ICT. This study promises effective use of ICT with whole brain concept of teaching and learning in technical education.

Key words: Information and Communication Technologies (ICT), thinking styles, technical education

Introduction

Recent advances in information and communication technology (ICT), Web based teaching and learning materials on the Internet, e-resources available in the field of technical education made the teachers in technical education enriching the professional competencies. These technologies have created many new opportunities for teachers in technical education. The provision and impact of ICT in technical education is a matter of considerable concern at the present time, since an appropriately skilled professional competency is essential for the success of many challenging initiatives. Beder (1998) viewed that Engineering is very much a social

activity with political, ethical and economic dimensions. It is an art that requires a variety of skills, including visualisation and communication skills. It also requires judgment and choices, and these have consequences for people that have to be considered and weighed up.

The human brain is marvelous to think and make wonders. Ned Herrmann built his cognitive approach on the basis of the works of both Sperry and MacLean (Sperry, 1977). He discovered the concept of brain dominance. Most people are familiar with the main hemispherical division i.e., left-brain and right-brain. These are the cerebral hemispheres and contain nearly 80 percent of the brain. Primary mental processes in these hemispheres include: vision, hearing, body sensation, intentional motor control, reasoning, conscious thinking and decision making, language and nonverbal visualization, imagination, and idea synthesis. Each cerebral hemisphere has a separate structure nestled into it is one half of the limbic system. The limbic system is a vital control center that regulates hunger, thirst, sleeping, waking body temperature, chemical balances, heart rate, blood pressure, hormones, and emotions (pleasure, punishment, aggression and rage). It plays a powerful role in teaching and learning since it is crucial in transferring incoming information to memory.

Ned Hermann (1988) examined the four-quadrant whole-brain model as a descriptive metaphor. The brain is visualized as a circle divided into four quadrants. To emphasize the metaphorical status of model, Ned Herrmann named the quadrants alphabetically to de-emphasize their connection with the cerebral limbic brain. The upper left (cerebral) quadrant is designated A, followed by B, C and D in a counter clockwise direction. Each quadrant has very

distinct cluster of thinking abilities or ways of learnings and knowing.

There are several approaches to study brain dominance during learning. According to Herrmann (1966) mental preferences are not solely predetermined genetically, but result from a combination of nature (genetic inheritance) and nurture (parenting, teaching, life experiences and cultural influences). These existing preferences are influential with regard to all the cognitive activities in which learners are engaged. A thinking style preference leads to a learning style preference and in turn determines a learners' dominant cognitive mode in which they communicate and receive information. The A-quadrant style is logical, analytical, and often bottom-line tough. No decision is made without the facts and reality. In the extreme, the A-style can be goal-driven, with a great emphasis on success at any cost, if the numbers look right. An A quadrant would require his/her colleague to be well versed in the facts and to use logic rather than intuition or gut feelings to make decisions. The B style is very detailed, structured and solid down-to-earth with no equivocation and ambiguity. Things are done according to procedure and on time, and delivered as promised. Neatness and protocol count, and time costs money. The average B-quadrant students value following orders, getting the project in on time, a well-organized and accurate documentation. The C-quadrant style is highly participative and team-oriented, and people are considered to be the most important asset. Human values and feelings are paramount and, if push comes to shove, people come first. To the C-quadrant students, the classroom should be friendly and condone open communication. Outside the college, people are just as important. C-quadrant students is always open and if something doesn't seem right, standard procedure is to

address the problem in a sensitive way. The D style is intuitive, holistic, adventurous, and risk taking. In contrast to it's diametrically opposed B-quadrant neighbour, its credo is, "If there is a better way, let's try it out," as opposed to "If it aim's broke, don't fix it". Experimentation is highly valued. And it is normal for a D-quadrant student to try out several approaches at once. The style is a very open one, with very little structure. Seeing into the future and avoiding shortsighted solutions in a common trait.

The two halves of the brain are not used by people in the same way and with the same frequency. Kevin (1988) analysed the Herrmann Brain Dominance Instrument (HBDI) and concluded that the adjacent factors are more likely to be correlated than opposite quadrants. Creativity is a function of more than one quadrant, especially of D combined with A or with C. The results strengthen the evidence for construct validity of the four clusters of brain dominance in the HBDI. De Boer *et al.* (2001) examined the thinking preferences of learners in cataloguing and classification using HBDI and found that. a strong preference in the C quadrant (97%) which implied of strong preference for the interpersonal, feeling based, emotional and spiritual thinking modes. The second most preferred quadrant is the B quadrant (81%) with a preference of controlled, structured and organized thinking mode. The D quadrant is third most preferred quadrant (68%) with creative holistic and synthesizing modes. The least preferred quadrant is A (55%) with a preference for analytical, rational, and logic processes. The learners did not possess the thinking preferences required to do cataloguing and classification. The result suggested that the teaching methods should be adapted to use preferences to develop needed skills and attempts must be made to utilize

preferences to master skills related to those aspects for which a low preference is shown. Ned Herrmann's whole brain model of thinking/learning styles articulates the three principles in ways that demonstrate similarities but also significant differences to the model devised by Dunn and Dunn. Herrmann discusses preferences through a vocabulary of the mental preferences and this reflects the original impetus Herrmann found in the brain research of MacClean (1955) and Coffield *et al.* (2004).

Edward Lumsdaine (1993) found that many engineering students and professors were left brain thinkers – logical, analytical, verbal and sequential. Their data also indicated a strong attrition rate among right brain thinkers, with many of them dropping out despite earning top grade in analytical courses. "A dominant reason for their choosing other majors is the inhospitable learning climate in engineering which does not accommodate their thinking preferences, even though voices in industry are increasingly demanding engineers with precisely those thinking skills". The authors reviewed the existing mechanical engineering curriculum, found it skewed toward left-brained thinking skills, and set out to provide a better balance by introducing more creativity, design, innovation, and teamwork into selected courses. One course, "Introduction to Computing", originally consisted of 20 percent quadrant A activities (structured programming). The redesigned version involved approximately 20 percent each for quadrants A and B and 30 percent each for quadrants C and D (student experiments, question formulation, design, modeling, and optimization).

Thomas Benesch (2000) examined that there are an equal number of people in all four basic groups. The whole brain model allows

for more sophisticated combination that measure both intellectual and emotional preferences which influence thinking styles and learning styles. Dorothy Leonard and Susan Straw (1997) made a very strong point for the use of HBDI and whole brain concepts to foster creativity and innovation, build and manage productive team, and communicate more effectively. Appropriately harnessed, and the more energy released by combining different thinking styles will boost creativity and innovation.

These results of similar studies led Lumsdaine Monika and Lumsdaine Edward (1995) to conclude that the HBDI can serve several important functions. These include helping students gain insight into their learning styles and formulate successful learning strategies; helping preferences; helping instructors and students form whole-brain teams for optimum problem solving; and assessing the influence of curriculum changes on individual and collective student thinking skills. The Herrmann Brain Dominance Instrument (HBDI) was used to give civil engineering students insight into their own thinking preferences, to foster awareness for the whole brain concept and acknowledge the existence of diversity in thinking skills (Horak et al., 2000). According to Herrmann (1995), every classroom represents a complete spectrum of learning style preferences. A diversity of thinking skills can be expected within a classroom sample. Herrmann also reported that the thinking preference profiles of engineers tend towards a preference of thinking modes of the left hemisphere.

Objectives

The major objectives are

(i) to explore the possibilities of developing preferred thinking styles of the teachers in technical education,

(ii) to resolve how the thinking styles help the teachers in technical education to apply ICT and teach in the classroom,

(iii) to examine whether there is any gender difference between male and female teachers in technical education with regard to thinking styles and application of ICT.

(iv) to examine whether there is any difference between polytechnic and engineering teachers in technical education with regard to thinking styles and application of ICT

(v) to examine whether there is my difference among age, experience in teaching groups of teachers in technical education with regard to thinking styles and application of ICT.

Hypotheses

(i) The teachers in technical education are having different preferred thinking styles and having rich knowledge about ICT,

(ii) There is no significant relationship between thinking styles and ICT of the teachers in technical education,

(iii) There is no significant difference between polytechnic and engineering teachers with regard to thinking styles and application of ICT.

(iv) There is no significant difference between male and female teachers in technical education with regard to thinking styles and application of ICT.

(v) There is no significant difference among different age group of teachers with regard to thinking styles and application of ICT.

(vi) There is no significant difference among the teachers based on their experience in teaching with regard to thinking styles and application of ICT.

Method

Sample

There were 97 teacher participants who had attended various short term courses conducted by the National Institute of Technical Training and Research, Chennai during 2005 - 06. There were 67 male and 30 female teachers with mean age 37 years, and their teaching experience varied from 2 to 15 years. All the teachers had post-graduation in technical education and were teaching at polytechnics or engineering colleges. They were involved in teaching at diploma and undergraduate levels. All of them had shown a keen interest and involvement in attending the sessions and sharing their views.

Instrument

Self-administered questionnaires were offered to all the 97 teachers in technical education. The following pshychological instruments were used to collect data from the teachers in technical education (i) Vijayakumar's Thinking Preferences Instrument (2000) was used to study thinking styles of the teachers in technical education. To emphasize the metaphorical status of the thinking preferences, the four quadrants of the brain is named as A for the upper left (cerebral) quadrant, followed by B, C and D in a counter clockwise direction. Each quadrant has very distinct clusters of thinking abilities or ways of learning and knowing. They are

> Quadrant A (Left, Brain, cerebral) – Logical, analytical, quantitative, factual, critical.

> Quadrant B (left brain, limbic) – Sequential, organized, planned, detailed, structured.

> Quadrant C (Right brian, limbic) – Emotional interpersonal, sensory, kinesthetic symbolic.

> Quadrant D (Right brain, cerebral) – visual, holistic, innovative.

The Instrument consists of 60 activities which are listed and presented in 15 sets of four activities in each set. The subjects were asked to read each set, and within each set rank the four activities in terms of how frequently, those activities the subject do or how much the subject like to do. Each set score are as follows.

4 – for activity which more often do or like to do

3 – for activity which often do or like to do

2 – for activity which occasionally do or like to do and

1 – for activity which rarely or never do or like to do

Maximum score is 60 and minimum score is 15

(ii) An instrument for assessing the knowledge about information and communication technologies. The instrument was constructed by the researcher. It has eight dimensions:

(i) Word Processing

> use simple editing e.g.bold, italics, centering, font size etc

> import text and images into a word processed document

> use templates for standard documents

> use the drawing tools to create shapes and Auto shapes

> save a document in various file formats including HTML

(ii) uses of media

➢ use over head projector

➢ use slide projector

➢ use LCD

➢ use web based teaching

➢ use online teaching

(iii) Power Point Presentation

➢ create a basic presentation package

➢ modify colours of text, lines and spaces on a slide

➢ introduce animation onto slides

➢ rearrange slides within a presentation

➢ produce appropriate handout formats

(iv) Using the Internet

➢ access an Internet site via its website address

➢ use search engines to find information

➢ use bookmarks/favourites for marking sites

➢ download files from the internet

➢ save text and images from web pages

(v) E-mail

➢ send and receive e-mail messages

➢ attach files to outgoing e-mails

➢ open and save files attached to incoming e-mails

➢ create new contacts in address book

➢ sort message and file in created folders

(vi) Professional usage

➢ organise and manage the use of ICT in the organisation

➢ extend students learning in a subject through the use of ICT

➢ pose questions to stimulate students and direct them when they are using ICT

➢ provide a list of relevant web sites for topic areas

➢ include Internet sites in learning activities

(vii) Use of ICT in institution

➢ use generic software, e.g. word processing, spreadsheets, databases, for administration purposes

➢ use peripherals, e.g. scanner or digital camera, to import images for teaching materials

➢ use the college intranet to publish course information

➢ use e-mail and subscribe to mailing lists to communicate with colleagues

➢ use automation in the organization

(viii) E-content

➢ prepare e-content for teaching

➢ interested in online learning and teaching

➢ familiar in web designing

➢ create web sites for teaching

➢ interested in applying latest advancements in ICT

and (iii) A personal information schedule was also used to collect demographical data consisting of age, gender, experience in teaching and type of institution

Procedure

The researcher conducted technical sessions on role of thinking styles in teaching and learning to the teacher participants. At the end of the session he obtained data from them by administering the ICT instruments. The teacher participants had shown keen interest in providing the data and knowing about their preferred styles of thinking.

Result and Discussion

Table 1 preferred thinking styles of teachers in technical education N = 97

S.No.	Quadrant	Percentage
1.	A	26.49
2.	B	21.42
3.	C	36.71
4.	D	25.28

Table 1 indicates that 26.49% teachers are of preferred quadrant A thinking style. They are considered to be typically authoritative, directive in all activities. They are comfortable with concrete information, like computer programming, equipment, stock market indexes, chemical formulas, medical terms and legal briefs. They live in a rational, technical world where most things can be explained in logical, analytic terms. Opinions, unless backed up with factual evidence, are not considered important. Their discussions are mostly restricted to technical. The only time they enjoy talking with others in the process of analyzing and defining the facts and in debates on the best equipment, methodology, etc., In the absence of feedback, a person's style begins to harden and become more and more unchangeable. They use words like, How? prove it? Must, typically should, explain, logical, rationally, I think, quotes statistics and evidences. Interested in :-Purchasing useful objects only, interested in reading business articles, business analysis and statistics, balance sheets, etc. They do not understand others feelings and emotions. They talk as a matter of fact, do not like humor. They keep calculator always.

21.42% teachers are of preferred quadrant B thinking style. They are considered to be typically traditional, conservative and risk avoiding. They strive for safety and stability, hence they resist change. They excel at structure, following procedures and taking in to account all the details necessary to meet deadlines. They like order and work best in an organization where the line of authority is clear. Accountability is more important for B-quadrants. So they follow the rules strictly. They typically avoid risk and focus primarily on short-term results. In extreme cases even they "use scale to cross a cheque" The A and B quadrants are practical and realistic. They are characteristically hard than soft. They use words like usually, quoting past incidents, quotes rules and regulations, plans ahead before talking, think and talk about the safety procedures. They keep their office/house in a neat and orderly manner, use scales and pencils frequently, get irritated for being late, complete the work in-time, spend more time in planning. Plans about the food timings and arrangements and accommodations while going for a picnic rather than enjoying the trip. Wants everything to go in an undisturbed smooth fashion, they always discourage new and creative ideas and resist any small change in the home or work place.

36.71% teachers are of preferred quadrant C thinking style. They are considered to be personable, interactive and care giving. They are highly participative and oriented to terms and communities, concerned about the people, fixes high value for the beliefs, sentiments and feelings of the people, like to advise/counsel others, ready to help needy even out of the way, likes to know by touching, they are comfortable with people, they are 'Soft' and musical people, prefer to talk and listen to. They use words like I feel, pleasure, crazy, shouts, humorous, touches other while talking, please, consider, accept, excellent, lovely, beautiful, talks about picnics, music, culture, shouts, humorous, touches others while talking, etc. Always with people, buy postures of natural scenes, sends greeting cards to friends during occasions. They like to

go for tours and picnics frequently with family and friends.

25.28% teachers are of preferred quadrant D thinking style. They are considered to be holistic, risk-oriented, adventurous initiative, entrepreneurial. They are conceptual, imaginative, integrative, adventurous, risk oriented, global, like big picture than words and visionary. They talk about possibilities, strategic planning, not time bound, independent, playful, inventive. They are innovative, unsystematic, does always different think about the future, open minded and less conservative. While talking they ask "why not", "what if", "try", "novel", last minute action. They procrastinate but complete the assignments. They are unplanned / day dreaming and interested in novelty, shabby house and office.

The individual thinking preferences of the teachers, interpreted according to Herrmann's four-quadrant whole brain concept, are diverse (Herrmann 1996). The composite profile of 97 teachers in technical education represents preferences of thinking style in all four quadrants. This finding is in accordance with research that every classroom represents a complete spectrum of learning style preferences. It displays a composite whole of the diverse individual profiles representing thinking preferences in all four quadrants (De Boer et al., 2001). Hence the formulated hypothesis is accepted that the teachers in technical education are having different preferred thinking styles and 61% of teachers are having working knowledge about application of ICT in their teaching.

Table 2 reveals that there is no significant difference between polytechnic and engineering teachers. Both are equally disposed towards thinking styles and application of ICT in teaching. Hence the formulated null hypothesis is accepted.

Table 3 the results reveal that there is no significant difference between male and female teachers. Both male and female teachers are equally disposed towards thinking styles and application of ICT in teaching. Hence the formulated mull hypothesis is accepted

Tables 4 and 5 provide Mean, SD. SEM and F-value of the different age groups of

Table 2 Mean, SD, SEM and F - value obtained from polytechnic and engineering teachers with regard to thinking styles and application of ICT (N = 97).

Quadrant	Group	N	Mean	Std. Deviation	Std. Error Mean	F - Value	Sig
A	engineering	34	39.82	9.737	1.670	1.584	.211
	polytechnic	63	39.70	11.043	1.391		
B	engineering	34	30.76	8.756	1.502	3.317	.072
	polytechnic	63	32.83	10.837	1.365		
C	engineering	34	41.26	7.645	1.311	5.764	.018
	polytechnic	63	39.41	9.576	1.206		
D	engineering	34	37.71	10.579	1.814	.260	.612
	polytechnic	63	38.03	10.083	1.270		
ICT	engineering	34	24.32	5.121	.878	.109	.742
	polytechnic	63	24.51	4.680	.590		

Table 3 Mean, SD, SEM and t-value obtained from male and female teachers with regard to thinking styles and application of ICT (N = 97).

Quadrant	gender	N	Mean	Std Deviation	S E M	F	Sig
A	male	67	38.91	10.993	1.343		
	female	30	41.60	9.405	1.717	2.113	.149
B	male	67	33.58	10.557	1.290		
	female	30	28.80	8.458	1.544	3.753	.056
C	male	67	39.28	9.549	1.167		
	female	30	41.80	7.289	1.331	4.768	.031
D	male	67	37.90	10.240	1.251		
	female	30	37.97	10.304	1.881	.307	.581
ICT	male	67	24.19	4.573	.559		
	female	30	25.00	5.350	.977	3.162	.079

Table 4 Mean, SD, and SEM among different age group of teachers with regard to thinking styles and application of ICT. (N = 97).

Quadrant	Age Group	N	Mean	Std. Deviation	Std. Error
A	below 30	35	39.37	10.622	1.795
	31 to 35	32	37.28	10.946	1.935
	above 36	30	42.80	9.579	1.749
	Total	97	39.74	10.553	1.071
B	below 30	35	32.49	11.390	1.925
	31 to 35	32	31.28	8.865	1.567
	above 36	30	32.53	10.214	1.865
	Total	97	32.10	10.158	1.031
C	below 30	35	40.29	9.083	1.535
	31 to 35	32	41.84	8.037	1.421
	above 36	30	37.90	9.539	1.742
	Total	97	40.06	8.950	.909
D	below 30	35	38.00	10.672	1.804
	31 to 35	32	38.91	10.059	1.778
	above 36	30	36.77	10.033	1.832
	Total	97	37.92	10.206	1.036
ICT	below 30	35	23.74	4.032	.681
	31 to 35	32	23.44	3.902	.690
	above 36	30	26.33	5.996	1.095
	Total	97	24.44	4.813	.489

teachers in technical education with regard to their thinking styles and application of ICT in teaching. The results reveal that there is no significant difference among different age groups of teachers in technical education. Teachers of all age groups are equally disposed towards thinking styles and application of ICT in teaching. Hence the formulated null hypothesis is accepted

Tables 6 and 7 provide Mean, SD, SEM and F-value of the different groups of teachers

Table 5 ANOVA for the teachers based on their age group with regard to thinking styles and application of ICT. (N = 97)

Quadrant	Group	S S	Df	MS	F	Sig.
A	Between Groups	479.117	2	239.558	2.205	.116
	Within Groups	10211.440	94	108.632		
	Total	10690.557	96			
B	Between Groups	32.291	2	16.145	.154	.858
	Within Groups	9872.678	94	105.028		
	Total	9904.969	96			
C	Between Groups	243.567	2	121.784	1.537	.220
	Within Groups	7446.062	94	79.213		
	Total	7689.629	96			
D	Between Groups	71.255	2	35.627	.337	.715
	Within Groups	9928.085	94	105.618		
	Total	9999.340	96			
ICT	Between Groups	156.711	2	78.355	3.563	.032
	Within Groups	2067.227	94	21.992		
	Total	2223.938	96			

Table 6 Mean, SD, and SEM among different groups of teachers based on their experience in teaching with regard to thinking styles and application of ICT (N = 97).

Variable	Group	N	Mean	S D	Std.Error
A	less than 3 years	44	40.48	10.887	1.641
	4 to 6 years	21	43.38	8.576	1.871
	above 7 years	32	36.34	10.551	1.865
	Total	97	39.74	10.553	1.071
B	less than 3 years	44	33.36	10.530	1.588
	4 to 6 years	21	30.52	9.416	2.055
	above 7 years	32	31.41	10.201	1.803
	Total	97	32.10	10.158	1.031
C	less than 3 years	44	39.11	8.824	1.330
	4 to 6 years	21	40.43	7.884	1.720
	above 7 years	32	41.13	9.869	1.745
	Total	97	40.06	8.950	.909
D	less than years	44	36.77	9.418	1.420
	4 to 6 years	21	36.29	10.474	2.286
	above 7 years	32	40.56	10.857	1.919
	Total	97	37.92	10.206	1.036
ICT	less than 3 years	44	24.66	4.435	.669
	4 to 6 years	21	25.76	5.822	1.270
	above 7 years	32	23.28	4.467	.790
	Total	97	24.44	4.813	.489

Table 7 ANOVA for the teacher based on their experience in teaching with regard to thinking styles and application of ICT (N = 97)

Quadrant	Group	Sum of Squares	df	Mean square	F	sig.
A	Between Groups	671.408	2	335.704	3.150	.047
	Within Groups	10019.148	94	106.587		
	Total	10690.557	96			
B	Between Groups	137.830	2	68.915	.663	.518
	Within Groups	9767.139	94	103.906		
	Total	9904.969	96			
C	Between Groups	78.554	2	39.277	.485	.617
	Within Groups	7611.075	94	80.969		
	Total	7689.629	96			
D	Between Groups	337.452	2	168.726	1.642	.199
	Within Groups	9661.888	94	102.786		
	Total	9999.340	96			
ICT	Between Groups	81.774	2	40.887	1.794	.172
	Within Groups	2142.165	94	22.789		
	Total	2223.938	96			

based on their experience in technical education with regard to their thinking styles and application of ICT in teaching. The results reveal that there is no significant difference among teachers based on their experience in technical education. Invariably all the teachers of varied experience in teaching are equally disposed towards thinking stales and application of ICT in teaching. Hence the formulated mull hypothesis is accepted.

Limitations

This was a limited, local study and the findings presented in this paper limited generalization value. They do however; have naturalistic generalization value (Cohen, Mansion and Morrison, 2000). Owing to the limited resources the study was carried out on a small sample of teachers who had attended the short term courses in the National Institute of Technical Teachers' Training and Research, Chennai.

Conclusion

In fact, the study was to find out the preferred thinking styles and application of ICT in teaching technical education. The findings of the study encourages that the teachers of different categories can make use the concept of whole brain teaching so as to inspire the learners. The teachers of technical education are having opportunities to make use of the recent advancements in ICT and e-resources in the modernized classrooms. In order to overcome the rapid changes in the global scenario, the teachers of technical education can utilize the opportunities of learning the concept of whole brain teaching and apply it in the classroom situation. Thereby the teacher of technical education can create a new learning environment to meet the challenges and make the teaching-learning process more interesting and purposeful.

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