Journal
School of Pedagogical Sciences

PEDAGOGICS

September 2007 Vol. VI No. 1

Mahatma Gandhi University
Kottayam

REFERENCE

Pedagogics

2007

PEDAGOGICS

Vol.VI No.I September 2007
A Journal from School of Pedagogical Sciences
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Editorial

The issue of the journal gives a feel of the dazzling scenario of education and its challenges particularly in teaching – learning. The research articles and write-ups highlight the current problems and trends in the field of teacher education and draws attention to its stark realities.

Dr. Premnadh through his study tries to determine whether there exists any marked differences between a developed Western country like Australia and a developing Asian country like India in students' scientific literacy regarding the GHE due to differences in context, culture and education system. Dr. Soman analyses different interpretations of reflective thinking given by different groups of educationists. Dr. Telawar found that majority of teacher educators do not have the bare minimum knowledge of GATS and the inclusion of education under it. Dr. Excimal enlightens the educational authorities, curriculum planners and teaching community to design suitable interactive learning strategies across the curriculum to promote various life skills, intellectual capabilities and academic attainments. Dr. Jacob and Dr. Jasemon state that study habits and intelligence are highly influencing the acquisition of concept in biology.

Dr. Sudharma and Sunia jointly reflects on kolb's experiential learning style and Dr. Celine and Tessy highlight the importance of multi-media approach. Dr. Jaya together with Chacko illustrated how a well designed dictionary can be of great benefit to students for self-learning. Dr. Thulasidharan talks about environmental sustainability. Dr. Minikutty and Dhanya discuss the efficacy of test-taking strategies while Dr. Jayasree and Jasmin compared the problems of normal and hearing impaired children. Dr. Esther had developed a model for teaching biology. Dr. Sindhya examined the tremendous impact of cognitive learning strategies on peer tutoring.

Dr. Babu suggests how difficult and abstract concepts in science can be made lively and meaningful through ICT. Dr. Jairon deals with learning disabled children, whereas Dr. Anitha tried to study about Emotional Intelligence. Dr. Geetha presents certain dreams that have to be realised in the field of teacher education.

We appreciatively acknowledge all the contributors for their supports and co-operation and also invite learned contributions from academicians and practitioners to further enhance the quality of this journal.

Warm welcome for opinions and comments.

PEDAGOGICS

Vol. VI No. 1 September 2007

CONTENTS

High School Students' Beliefs about, Understandings of and Intentions to Act Regarding the Greenhouse Effect

Dr. Premnadh M. Kurup

Background

The greenhouse effect (GHE) is a concern to everyone on this planet. To understand the GHE, students and citizens need an understanding of the science processes underlying this environmental phenomenon. The solutions to major environmental problems are not easy and require major changes in lifestyle and an international agreement is required for cooperation in educating people about environmental issues, to an unprecedented scale (Houghton, Jenkins, & Ephraums, 1990).

The enhanced greenhouse effect has caused climate changes and an increased incidence of natural disasters such as droughts, bushfires and floods, and hotter summers and cooler winters (IPCC, 2001). It is time for us to find a path that is better for people and less harmful to the environment with the policies, knowledge and technologies at our disposal today. The human family should take tentative steps in this enlightened direction (Earth Summit, 2002). In this context, it is very important that high school students should be scientifically literate and be committed to acting in ways that reduce greenhouse gas emissions.

Global warming is accelerated by human activities like industrialization, deforestation, farming and increased energy consumption through transportation and use of air conditioners (IPCC, 2001; Penning, 1993). There are several national and international reports emphasising the importance of education and community based actions to reduce the impacts of environmental problems. The Australian Greenhouse Office (AGO, 1999) in its annual report revealed that household energy consumption is one of the major (almost one fifth) contributors to greenhouse gas emissions. The AGO (2000) has been involved in many awareness and educational programmes to promote public understanding about the impact of the greenhouse effect and its enhancement due to energy consumption.

The United Nations Environmental Programme (UNEP) documents and Intergovernmental Panel for Climatic Changes (IPCC) reports indicate the extent of impacts of human actions and enhanced GHE on climate change. Further these reports provide suggestions for education about the causes, mechanisms, importance and impacts of the greenhouse effect, and ways by which greenhouse gas emissions can be reduced.

In democratic societies the importance of education lies in making it easier for governments to promote policies that will help alleviate the problem (United Nations, 1992). Informed decision-making is considered to be an important outcome of science education (Bybee, 1993; Fensham, 1988; Malcom, 1987; & Yager, 1993).

A scientifically literate public would improve the quality of public decision-making and actions. An understanding of the GHE is an important aspect of scientific literacy. Scientific literacy and public understanding of environmental issues developed in science classrooms can provide a foundation for informed decision making about socio-scientific issues like greenhouse gas emissions and empower communities to take appropriate actions for a sustainable, green and clean environment (Samford, 1999; Hart, 2002; Olson et al, 1999; & Solomon, 1999). This study (Kurup, 2003) investigated student's beliefs, understandings and intentions to act in ways that would reduce greenhouse gas emissions at the end of compulsory (Year 10) and non-compulsory schooling (Year 12).

Purpose

The purposes of this study were to:

1. Investigate Year 10 and 12 Australian and Indian students' beliefs about the greenhouse effect, understandings of the mechanisms of the greenhouse effect and intentions to act in ways that would reduce greenhouse gas emissions; and
2. construct two pictures, one of the ideal scenario and another of the actual situation regarding students' beliefs, understandings and intentions.

Methodology

This study focused on high school students' beliefs about, understandings of the GHE and their intentions to act in ways that would reduce greenhouse gas emissions. Aspects of the GHE that are taught in high school science were also investigated. The study was conducted in five schools each in Western Australia (Australia) and Kerala (India) and data were collected from 438 Year 10 and 12 students representing compulsory and post-compulsory stages of education in both states. Two hundred and thirteen students from Western Australia and 225 students from Kerala completed a questionnaire and a sample of students and Heads of science were interviewed. The study was conducted in a developed Western country and a developing Asian country to determine if there were marked differences in students' scientific literacy regarding the GHE due to differences in context, culture and education systems.

An ideal scenario of students' beliefs about, understanding of the GHE and commitments to take actions that would enable individuals and communities to reduce greenhouse gas emission was developed based on a propositioned knowledge statement (pks) attached as Appendix 1, and reports such as IPCC (2001), UNEP (2001), AEO (1999, 2001 and UN (1992).

An actual scenario was constructed based on the data collected from student questionnaires, student interviews and meetings with Heads of science Departments.

Results and Discussions

Ideal Scenario

The Propositional Knowledge Statement (PKS), which was developed and validated by experts, includes propositions about: the importance of the natural GHE; the causes, mechanisms and impacts of the enhanced GHE; and the importance of reducing greenhouse gas emissions. The PKS represents the essential knowledge that high school students need to understand the GHE, interpret media reports and to inform appropriate actions to reduce greenhouse gas emission.

Figure 1 - **Ideal Scenario**

Students' believe that the GHE is:

- Real and affecting our climate, and will continue to affect our climate in the future.
- An important societal issue that requires personal, community and governmental actions to reduce its effect.

Students' understand that:

- The GHE is a natural phenomenon in terms of absorption and emission of solar radiation by the Earth and its atmosphere thereby keeping the planet habitable.
- Human activities like burning fossil fuels for electricity and transportation, industrialisation, deforestation and farming have increased greenhouse gas emissions.
- Enhanced concentrations of greenhouse gases have increased the heat energy trapped by the atmosphere resulting in increased global temperatures, a rise in sea levels and changes in the climate.

Students' are committed to take appropriate decisions and actions to reduce greenhouse gas emission by:

- reducing energy consumption in their homes
- reducing energy consumption through transportation, and by
- supporting and engaging in community and governmental level actions to reduce greenhouse gas emissions.

The enhanced GHE has caused climate changes and an increased incidence of natural disasters such as droughts, bushfires and floods, and hotter summers and cooler winters (IPCC, 2001). It is time for us to find a path that is better for people and less harmful to the environment with the policies, knowledge and technologies at our disposal today. The human family should take tentative steps in this enlightened direction (Earth Summit, 2002). In this context, it is very important that high school students should be scientifically literate and be committed to acting in ways that reduce greenhouse gas emissions.

Actual Scenario

The actual scenario provides a picture of students' beliefs, understandings and intentions to act in ways that would reduce greenhouse gas emissions, and is based on the data gathered from Year 10 and 12 Australian and Indian students in this study. The major findings from the student survey and interviews are discussed in terms of the research literature and previous studies, before generating the actual scenario.

Students' Beliefs about the Greenhouse Effect

In this research, the following aspects of students' beliefs about the GHE were studied; its reality, relative importance compared to other social issues, effect on global warming, and what actions the governments and they, personally, should take. The major findings of this study regarding students' beliefs about the GHE were the following:

Reality

The majority of Australian and Indian Year 10 and 12 students believe that the GHE is real and affecting our climate at present and will affect it in the future.

Relative importance

Australian and Indian Year 10 and 12 students ranked the GHE fourth of seven important social issues which included; economic issues and poverty, the GHE, increasing crime, terrorism, health and diseases like AIDS, family breakdown, and increasing drug use. It can therefore be concluded that the GHE is considered by students to be an important social issue.

Effect on global warming

The majority of Australian and Indian Year 10 and 12 students believe that there will be substantial changes to average global temperature and sea level rise over the next 50 years, however, their estimates of these changes are not consistent with scientific predictions.

Personal and governmental actions

A small majority of Australian and Indian Year 10 and 12 students believe that what they do has an impact on the GHE, however, a quarter of all the students are not sure how they have an impact on the GHE.

The majority of Australian and Indian Year 10 and 12 students believe that governments should conduct more programmes to raise community awareness about the GHE and enact strict laws to reduce greenhouse gas emissions.

The Australian Greenhouse Office (AGO, 1999) investigated community awareness of, and attitude to climate change. The research revealed that 19% of the Australian public rated the environment as the issue of most concern to them, ahead of economic issues. The enhanced GHE was rated seventh in importance in a list of 17 environmental issues. Further, respondents indicated that all governments need to be, and seen to be leading the way in terms of reducing greenhouse gas emissions. Another survey of over 1000 British 15 and 16 years olds revealed that of four issues; loss of ozone layer, destruction of tropical rain forests, global warming and greenhouse effect, and loss of animal and plant species; global warming and the greenhouse effect was ranked third (Morris & Schagen, 1996). In this study of Australian and Indian Year 10 and 12 students the GHE was ranked fourth among seven important social issues which included economic issues and poverty, health and diseases like AIDS, increasing drug use, terrorism, family breakdown and increasing crime. These three studies confirm that many secondary students and members of the general public consider the GHE to be an important social issue that they are concerned about.

In this study, a large majority of the students (more than 85%) believe that governments should conduct more programmes to raise community awareness about the GHE and enact strict laws to reduce the release of greenhouse gases. This finding is consistent with the findings of the Australian Greenhouse Office's investigation regarding the public's attitudes about environmental issues (AGO, 1999). A small majority of Australian and Indian Year 10 and 12 students believe that what they do has an impact on the GHE, however a quarter of all the students are not sure about it. These data suggest that students' may believe governments have a greater role to play than individuals in solving this environmental problem.

Students' Understanding of the GHE

The following are the important findings from this study regarding the students' understanding of the GHE:

Global warming and climate change

The majority of Australian and Indian Year 10 and 12 students did not understand that the natural GHE is keeping our planet habitable.

The majority of Australian and Indian Year 10 and 12 students understand that the GHE causes global warming, however, less than half could explain how or why.

The majority of Australian and Indian Year 10 and 12 students' understanding of anticipated global temperature rise and sea level rise are not consistent with scientific predictions.

Causes of the GHE

A large majority of Australian and Indian Year 10 and 12 students understand and explained that the burning of fossil fuels and deforestation increase the GHE.

Farming

A small majority of Australian and Indian Year 10 and 12 students were aware that cattle and sheep farming enhanced the GHE but less than one third of all students could explain why or how cattle and sheep increase the GHE.

Mechanism of the GHE

Students' understanding of the absorption and reflection of solar radiation by the Earth and atmosphere, and gases causing the GHE were investigated. The students' understanding of the mechanism of the GHE were categorised into five levels. Level 1 represents the highest level of understanding and level 5 represents the lowest level of understanding exhibited by the students in the sample.

Less than 10% of students provide a complete and scientifically accurate explanation of the mechanism of the GHE (Level 1).

The majority of the Australian students have a minimal understanding or misconception about the mechanism of the GHE (Level 4 and 5).

The majority of Indian students have a modest understanding about the mechanism of the GHE (Level 3).

The majority of students in this study have a general or big picture understanding of the GHE, however, less than 10% could explain the details of the energy flow mechanisms. The majority of students could not identify greenhouse gases other than carbon dioxide.

To be able to understand the importance of actions like switching off lights when they are not needed to reduce the GHE, students should be able to link scientific aspects of the GHE and its energy flow mechanism. It is observed from this study that most students are unable to link power generation, carbon dioxide emission and energy trapping to subsequent enhancement of the GHE. A significant number (about 18%) of students confused ozone layer depletion with the GHE. Many students think that the holes in the ozone layer are allowing ultra violet radiation to pass through the atmosphere and cause global warming. There are also a significant numbers of students (about 30%) who think that pollution is the cause of global warming (Level 5 category of understanding). Students' understanding of the causes and mechanisms of the GHE is inadequate and that is why they could not explain the importance of reducing personal energy use to reduce greenhouse gas emissions. To realise the importance of energy use and greenhouse gas emission, it is necessary to understand the causes and mechanisms of the GHE.

This study has revealed two significant weaknesses in students' understanding of the GHE; energy flow mechanisms, and the sources and roles of greenhouse gases other than carbon dioxide. In addition to this, many students do not understand that the GHE is keeping the planet habitable and many students do not have an accurate understanding of the anticipated rise in average global temperature and rise in sea level.

The fact that students at high school have only a vague, big picture understanding of the GHE and could not explain the causes, effects and mechanisms of the phenomenon is a serious problem as it limits their capacity to

make informed decision about their day to day energy use.

Students' Intentions to Act in Ways that would Reduce Greenhouse Gas Emissions

Students' intentions to act in ways that would reduce greenhouse gas emissions were investigated in relation to reduction in household energy use, and reducing the use of air conditioners and cars. Students were also asked about actions that should be taken by governments. The situations and scenarios were set in contexts that are relevant to both Australian and Indian families.

The following statements summarise findings about students' intentions to act in ways that would reduce greenhouse gas emissions:

Household reduction of greenhouse gas emission

The majority of Australian and Indian Year 10 and 12 students and their families are already taking, or consider taking actions regarding 10 easy ways of reducing household energy consumption and thereby greenhouse gas emissions (eg, use compact fluorescent lights, switch off lights and electrical appliances when they are not in use, etc.).

Sacrificing comfort and convenience to reduce greenhouse gas emissions

The majority of Australian and Indian Year 10 and 12 students are not prepared to sacrifice personal comforts or convenience to reduce greenhouse gas emission by using public transport instead of cars, or by reducing the use of air conditioners.

Government actions

The majority of Austalian and Indian Year 10 and 12 students suggested that governments should enact strict laws to reduce greenhouse gas emissions and sign the Kyoto protocol. A considerable number of students (about 40%) suggested that governments should take steps to do research on alternative energy sources and fuels, reduce deforestation and plant more trees, and provide more information and education regarding reduction of greenhouse gas emissions.

The majority of students and their families are already taking actions where they don't have to make a capital investment in their home eg. turning off lights. The motivation for these actions may be to reduce electricity bills rather than to reduce greenhouse gas emissions. Their responses to proposed changes, which require capital investment, were not that positive eg. installing insulation. Household energy consumption is a major contributor to greenhouse gas emissions (AGO, 2000) and personal actions are very important in reducing emissions. Energy use for transportation, air conditioners and other comforts are also play a vital role in greenhouse gas emission. The majority of students are not prepared to sacrifice their personal conveniences or comforts for reducing gas emissions. They are not prepared to use public transport rather than cars or reduce the use of air conditioners. The majority of students suggested that governments should enact strict laws to reduce greenhouse gas emission and sign the Kyoto protocol. The irony here is that students are expecting governments to reduce greenhouse gas emission, yet are not prepared to make hard decisions themselves. Governments can only reduce greenhouse gas emission by imposing cost penalties on activities that generate greenhouse gases, eg. taxes on cars and fuels.

No previous study has specifically set out to identify students' intentions to act in ways that would reduce the GHE, however, the importance of such studies is mentioned extensively in the science education literature (AAAS, 1989, 1993 & 1997; Fensham, 1997; Gayford, 2002; Kolsto, 2001; & NRC, 1996). Studies have been conducted to identify decision-making about biological conservation

(Grace & Ratcliffe, 2002), however, there were no findings from this study of relevance to this research on the GHE.

According to the theory of reasoned action (Ajzen & Fishbein, 1980) a persons' intention to act regarding an issue is influenced by their understandings and beliefs about the issue. This study has identified high school students' understandings and beliefs about the GHE, and their intentions to act to reduce greenhouse gas emission.

The main findings of this study regarding the students' beliefs, understanding and intentions to act to reduce greenhouse gas emission are summarised as the actual scenario in Figure 2.

Figure 2 - **Actual Scenario**

Beliefs

The majority of students believe that the GHE is real and is affecting our climate at the present and will do so in the future, however, they are not sure about their personal impact on greenhouse gas emissions. They also believe that governments should enact strict laws to reduce greenhouse gas emissions.

Understandings

The majority of students understand that the GHE is causing global warming, although they could not explain how or why. They did not understand that the natural GHE is keeping the planet habitable and they have either minimal understanding or misconceptions about the mechanism of the GHE. They understand and are able to explain the role human activities play in enhancing the GHE; however, their understandings of the expected rise in average global temperature and sea level were not consistent with scientific predictions.

Actions

Most students and their families are already taking or considering taking action regarding 10 easy ways to reduce household energy consumption and greenhouse gas emissions. They are not prepared to sacrifice their personal comforts or convenience to reduce greenhouse gas emissions, and they held strong views about this. They suggested that governments should enact strict laws to reduce greenhouse gas emission and sign the Kyoto protocol.

The ideal scenario describes what high school students should believe, understand and be prepared to do to reduce greenhouse gas emissions, considering the importance of the issue at present and its impact on global climatic changes. The actual scenario describes high school students' actual beliefs, understandings and willingness to act to reduce greenhouse gas emission and is based on the data gathered in this study. The common aspects in ideal and actual scenarios include: an understanding that the GHE causes global warming; the importance of community and governmental actions; students believe that the GHE is real and causing global warming; and, they expect the government to enact strict laws to reduce greenhouse gas emission and sign the Kyoto protocol. The major differences are in understanding the energy flow mechanism and the importance of personal actions to reduce greenhouse gas emission where their knowledge about the links between energy consumption, greenhouse gas emission and energy trapping by the atmosphere is inadequate to explain the importance of personal actions to reduce greenhouse gas emission in the actul scenario.

Interviews with Heads of Science Departments and analysis of science and chemistry textbooks and syllabus documents in Western Australia and Kerala revealed that the greenhouse effect receives scant attention in the implemented school curriculum. Heads of Science Departments agree that the GHE is an important aspect of scientific literacy and should be given greater priority, however, it is not examined in the external Year 12 examinations in Western Australia or Kerala, and therefore is not taught.

Implications

The GHE is a serious environmental issue and requires collective responsible actions at local, national and international levels as scientists' projections indicate that if we continue on our current course, the average global temperature will increase by a catastrophic 3 to 6 degrees Celsius as a result of increasing greenhouse gas emissions (Watson, R., et al., 2001). If we wish to stabilise greenhouse gas concentrations at twice pre-industrial levels by the end of this century, we will have to reduce our emissions to at least half of 1990 levels (Wallace, 2000).

The main aim of environmental education should be to prepare students for participation in personal, social and governmental actions for a sustainable and green environment. To make informed decisions, citizens need to be informed (Alexandre & Munoz, 2002; Gough, 2002; & NRC, 1999). Scientific literacy is a high priority for all citizens, helping them to be interested in scientific matters, to be sceptical, to be able to identify questions and to make informed decisions about the environment and their own health and well being Goodrum et al., 2001; Hacking, 2002 & Hacking et al., 2001). Informed citizens would create an atmosphere for increased partnership between communities and governments for change or at least make it easier for politicians to promote the policies that will help to alleviate the issues (Gayford, 2002; & UN, 1992). There is need for change in direction regarding environmental education in terms of what might learning look like, what might teaching look like and what might curriculum look like (Dillon, 2002).

The challenge for science educators is to make science relevant to the lives of students and explain scientific findings in ways that they can be applied in daily life (Goodrum, Hacking & Rennie, 2001) It is also important to link scientific and environmental issues with social and cultural contexts to amplify their significance and to emphasis the personal, social and governmental actions needed to address the issues, particularly issues such as the greenhouse effect and global warming (Dillon, 2002; Hart, 2002; & NRC, 1999).

Environmental issues such as the GHE must be included as core material in science syllabi and be included in external Year 12 examinations if they are to be given serious treatment in the school curriculum.

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Appendix 1

Propositional Knowledge Statement

The Greenhouse Effect

1. The Greenhouse Effect is a natural process in which some gases in the Earth's atmosphere cause the atmosphere to act like a greenhouse, letting the Sun's energy in, but preventing some of the Earth's radiation from escaping to space.
2. Were it not for this natural effect, the Earth's climate would be much colder (by about 33 degrees Celsius), and life as we know it would not exist.
3. Solar radiation reaching the Earth consists mainly of infra-red, visible and ultra-violet radiation. Some of this solar radiation is reflected back into space, mainly by clouds. As solar radiation passes through the atmosphere most ultra violet radiation is absorbed by ozone in the stratosphere and a small portion of the infra-red and visible radiation is absorbed by other constituents of the atmosphere. The solar radiation that passes through the atmosphere is absorbed by the Earth's surface.
4. The Earth emits infrared radiation (heat). Some of this infrared radiation is absorbed by gases in the atmosphere and the rest escapes into space. The absorption of infrared radiation emitted by the Earth has an important role in maintaining the Earth's average temperature of 16 degrees Celsius.
5. The gases in the atmosphere that absorb infrared radiation are called greenhouse gases. Greenhouse gases include carbon dioxide, methane, ozone, nitrous oxide, water vapour and CFCs.
6. With the exception of water vapour, the other greenhouse gases constitute less than 1% in total of the atmosphere
7. Sources of greenhouse gases are as follows: (i) carbon dioxide, which is produced by the combustion of fossil fuels, and is also released in the atmosphere by deforestation, (ii) methane, which is produced by ruminant animals such as cows and sheep, rice paddy fields, natural gas fields and landfill garbage dumps; (iii) nitrous oxide, which is produced as a by-product of combustion processes and from fertiliser use, (iv) chlorofluorocarbons (CFCs), which are used as refrigerants, foaming

agents, solvents and aerosol propellants escape into the atmosphere; (v) ozone, which is produced in the lower atmosphere as a component of photochemical smog; and (vi) water vapour which is produced mainly by evaporation from the sea.

8. Over the last 100 years, the concentrations of greenhouse gases have increased in the atmosphere due to increased human activities.

9. Increased concentrations of greenhouse gases in the atmosphere have resulted in warming of the Earth's atmosphere, sometimes described as an enhanced greenhouse effect.

10. Climate change, caused by increased concentrations of greenhouse gases in the atmosphere, is now widely recognised as a major issue with the potential to cause significant damage to natural ecosystems, national and global economies, and human welfare.

11. Scientists from the Intergovernmental Panel on Climate Change (IPCC) consider that: (i) atmospheric carbon dioxide concentrations have increased by 30% since the industrial revolution; (ii) sea levels have risen by 10 to 25 cm since 1860; (iii) the mean global temperature has increased 0.4 to 0.8 degree Celsius since 1860; and (iv) several of the warmest years in the last 10,000 years occurred in the last 10 years.

12. Scientists from the Intergovernmental Panel on Climate Change (IPCC) predict the following impacts of the Greenhouse Effect during this century: (i) an increase in the Earth's temperature by about 0.2 degree Celsius in each decade; (ii) sea levels will rise between 40 cm to 1 metre as oceans expand and glaciers melt; and (iii) there will be changes in weather patterns, such as changes in rainfall and more severe droughts and floods.

13. The increase in greenhouse gas concentrations has been clearly established. However the extent of climate change cannot be predicted accurately.

14. The reduction of greenhouse gas emissions is increasingly being recognised as an important issue by governments, industry and the community. Every person can play a role in reducing greenhouse gas emissions.

15. In recognition of the seriousness of the Greenhouse Effect, many countries signed a treaty in December 1997 (Kyoto Protocol), which is an international obligation to limit greenhouse gas emissions.

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Reflective Thinking as Applied in Teaching and Learning - A Conceptual Analysis

Dr. K. Soman

(a) Reflection - Meaning

The word 'reflection' as used in the context of the thinking process, indicates the action of the mind by which it is conscious of its own operations. It may be said to be 'attentive consideration of a thought or utterance resulting from contemplation.'

According to John Dewey who is considered as the most prominent exponent of Education, reflection is a special form of thinking aimed at arriving at solutions to problematic issues. He considered reflection as an active and deliberate cognitive process based on well-sequenced and interconnected ideas, supported by beliefs, knowledge and experiences.

But even during early periods reflection as 'contemplation' was highlighted by philosophers and educators such as Plato, Aristotle, Confucius, Locke etc. Even Buddha stressed the need for looking within for making a self-examination of the past experiences so as to gain new insights into life in general and specific, complicated issues in particular.

(b) Modern interpretations of 'Reflection' with special reference to education

Interpretations can be for convenience considered at two levels (i) interpretations made by the constructivists and (ii) interpretations made by researchers in the last two decades of the 20th century with stress on reflective action including reflective teacher education and reflective teaching. Both maintain the spirit of reflection, the variation being only with regard to the stress.

(b. i) Interpretation of the constructivist/cognitive developmental theorists

Education should enable learners to construct their own knowledge and also to gain metacognition: that is, cognizing how knowledge was acquired. It is reflection that provides education with the potential to serve this function.

According to this view, if the learners are exposed to the ways of reflecting/contemplating past experiences and using these reflections to explore problematic situations posed by new experiences and information, they will develop the ability to process these, draw tentative conclusions, test their validity and to arrive at feasible solutions. This, in turn, will result in the construction of new knowledge (cognizing), which if properly registered will enrich their cognitive structure. Along with this, if they are made to consciously contemplate on the strategies employed by them to process the information with a view to solve the problematic situations, they would gain metacognition, that is, 'awareness of the process involved in cognizing.' This dual function of reflective learning was highlighted by the constructivist interpretation.

In this context it will be useful to recall how in almost all the models of teaching under the Information-Processing-Family, the last phase of the syntax is utilised for a conscious review by the learners about how they learnt the lesson.

(b. ii) Interpretations and analyses of the concept of reflection, made by researchers of the last two decades of the twentieth century

The wide scope of reflection in various aspects related to all walks of life in general and education in particular came to be recognized and appreciated thanks to the studies and research projects taken up by a set of educators during the last two decades of the twentieth century. Adler, Cutler, Cook and Young, Gilson, Farrah, Sehon, Calderhead and Brennen, Grant and Zeicher, Valli are only a few among them.

Originally it was believed that reflection is limited to thought processes that might lead to action, the stress being the thought process only. But some of the above researchers hypothesised and later substantiated the hypothesis that reflection is bound to end up in action. Earlier certain exponents of the concept had tried even to distinguish between critical thinking and reflective thinking by arguing that the former stressed the solutions to problematic situations while the latter was related only to the pure thinking process. This view has been exploded by the new perspective. In this context it maybe recalled that Dewey too had pointed out earlier, that the distinction between reflection and action should vanish.

The modern researchers raised another issue also, related to the concept of 'critical reflection' which is based on the question of reflective thinkers consciously using wider historic, cultural and political values or beliefs in framing and reframing practical problems for which solutions are being sought. The arguments are in favour of such critical reflection in social issues like education.

Following the views earlier held by Dewey about the need for reflective action, most of the modern researchers also hold a concensus about the importance of that concept. They believe in a complete cycle of professional doing (performance) coupled with reflection, which subsequently would move to modified action. This reflective action is considered to be bound up with persistent and careful consideration of practice having the support of knowledge and belief. The practice should be made with openmindedness, responsibility and whole heartedness. This view regarding reflective action is of immense relevance to the teachers. This will prompt a teacher to learn how to frame and reframe complex and ambiguous problems, interpret from these various points of view, test their validity and then modify their action accordingly (cf. Action research by teachers)

(c) Reflection on action and reflection in action

It is in the above context, that Sohon suggests two types of reflections to be practised by a teacher. These are 'reflection-on-action' and 'reflection-in-action' along with 'critical reflection.' By this strategy 'action' is reflected and evaluated on the basis of rational and moral processes leading to reasoned judgement about preferable ways to 'perform' instruction. These may be compared to gaining metacognition in reflective learning.

(c. i) Reflection-on-action

The reflective re-examination of the strategies followed and activities performed by a teacher while teaching can be cited as an example. This is done only after the task performance has been completed. This leads to metacognition and guidance for better performance in future. This points out to the need for organising a reflective discussion after a class is over, in which the teacher as well as his peers and the learners should actively participate. The point to be taken care of is that the discussion should follow the requirements of reflective thinking.

Modern researchers point out that reflection-on-action can be performed at four levels. While practice is given to the prospetive teachers these four levels should be considered in the hierarchical order. These are (i) technical (ii) descriptive (iii) dialogic and (iv) critical. The first level, viz. technical is meant for the beginners, where decision making is made on the basis of basic theories, beliefs etc. The practice of providing planned feedback through micro teaching sessions is an application of reflection-on-action at the technical level.

At the descriptive level a description of events during the task performance may be given, together with some attempt to provide reason/justification for each step taken in the action, but in a reportive or descriptive manner. This can be done by the person who performed the task or by those who witnessed the performance. Justification of the steps and strategies can be given at this stage. Alternate viewpoints also can be reported.

Dialogic reflection involves a stepping back from the action to a different level. This may be in the form of discussion with self (self reflection) or with others for exploring related experiences, events and actions. This may lead to passing of judgements and suggesting possible alterations and hypotheses. This reflection is more analytical in nature, providing plausible reasons for everything that happened in the class.

In critical reflection attempt is made not only to locate events but to review it with multiple perspectives based on multiple historical and socio-political contexts.

Here it may be pointed out that the concepts involved in reflection-on-action are important in shaping teachers as proficient reflecting teachers who will continuously aspire to improve their professional competence.

(c. ii) Reflection - in - action:

This is done by a teacher who has mastered strategies for reflective teaching by engaging in reflection-in-action for quite some time. Here the performer will be reflective during the course of the performance itself. The teacher reflects upon every action (strategy or procedure) as and when it is being implemented. Thereby, he can make adjustments, variations, modifications, etc. on the spot for the purpose of achieving the anticipated goals.

(d) Perspectives on reflection

The conceptual analysis attempted above on the basis of ancient and modern trends leading to variations in the scope and functioning of reflection reveals a common spirit linking all three view points. This gives rise to certain perspectives on reflection. These are emphasised below.

(d. i) Metacognition

An individuals ability to reflect is rooted in the concept of metacognition which has three components to be taken care of, these are (i) metacognitive knowledge that indicates awareness of ones knowledge as well as of the cognitive strategies leading to it (ii) metacognitive judgements and (iii) monitoring, control and self regulation of cognition. While reflecting, these three components will be found to overlap and thus metacognition will emerge as a product of reflection in its totality.

(d. ii) The significance of puzzling problems in development of reflective thinking

Theorists such as John Dewey King and Kitchner argue that an individual engages in reflection when he/she encounters problems with uncertain answers. A variety of tentative solutions may motivate the individual to reflect. Each hypothesis or potential solution to the problem will have to be evaluated. This continuous evaluation of beliefs, assumptions and hypotheses drawn from existing data is a prerequisite for reflective thinking. Practice in this process will result in metacognition of the cognitive process. In this context, it will be relevant to recall Piaget's and Suchman's

insistance on presenting challenging problematic situations leading to inquiry.

(d. iii) The importance of a philosophical mind

Belief in the tentative nature of knowledge and continuous evaluation of beliefs assumptions, etc is typical of a philosophical mind. This will always enter empathetically into thinking about concepts, aims, etc in a global way. Such a mind will always recognize the need for improving the systems, practices, strategies, etc. This self - reflection is at the root of effective reflective thinking.

(d. iv) The need for a 'portfolio'

The term portfolio indicates 'a loose and portable pool of inputs' that will act as an 'advance organizer' for the learner (the reflective thinker) that would act as the knowledge resource for him to search, organize and reorganize notes, thoughts, related tasks, etc. The inputs contained by the portfolio may be in the form of relevant books, booklets, research reports, papers, specimens, societal inputs, etc. It is with the help of these that the reflective thinker (learners) can examine, and critically reexamine the issue and the related data, tentative solutions etc from various perspectives with authenticity.

Finally, it has always to be remembered that reflection by learners without any guidance from anybody, as believed by some 'experts,' is a fallacy. Reflective thinking cannot emerge from a vacuum.

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Inclusion of Higher Education Services Under GATS - Opinion of Teacher Educators

Dr. M. S. Talawar

The growing importance of international trade and investment in higher education in recent years has created a global market for higher education. The precedent for trade in educational services goes back to the Golden Age of India. Universities at Nalanda and Takshashila were famous the world over, attracting students from foreign lands. Similarly there is a potential for growth of trade in educational services, especially at this point when globalization and liberalization is at its peak.

Globalization of education sector is evident from:

- Increasing number of students going abroad for study
- Exchange and linkages among faculties and researchers
- Increased international marketing of curricula & programmes
- Establishment of branch campuses
- Development of international mechanisms for educational cooperation between academic institutions across countries

As a result of this process, the General Agreement on Trade in Services [GATS, 1995] was signed under the purview of the World Trade Organisation (WTO) in 1995. The central idea of GATS is that progressive liberalization of trade in commercial services will promote economic growth in WTO member-countries. These commercial services are as diverse as entertainment, e-commerce, and education. But, is including education under GATS feasible in India where significant contribution to this sector comes from the government? Is trade is educational services compatible with WTO norms? As per Article 1.3 of GATS, government services remain outside the purview of GATS, provided they are not meant for commercial purpose and do not have any competition from private service suppliers. Hence, as per this article, education does come under the purview of GATS trade liberalization, since there are already many institutes, colleges, high schools, and coaching classes operating in the private sector in India. GATS is significant for education services in view of internationalization trends in this sector. Uruguay Round (1986-94) broadened the scope of world trade rules to include services. The aim was to establish a multilateral framework to promote orderly and transparent trade and investment liberalization in services. Member countries must comply with the GATS rules and disciplines given single undertaking nature of WTO.

1. What is GATS?

GATS is one of many WTO agreements, in force from Jan 1, 1995. It is a comprehensive legal framework of rules and disciplines covering 161 service activities across 12 classified sectors.

e.g. telecommunications, financial, energy, distribution, environmental, health, education, construction services

- GATS applies to measures taken at all levels of government and by non-governmental bodies to whom powers delegated by governments or authorities
- Excludes services supplied in the exercise of governmental authority
- GATS defines services trade as occurring via four modes of supply and they are.

Mode 1: cross border delivery ; cross border delivery of education services via internet (distance education, tele-education, education testing services)

Mode 2: consumption abroad; movement of students from one country to another for higher education (foreign students in US universities)

Mode3: commercial presence; establishment of local branch campuses or subsidaries by foreign universities in other countries, course offerings by domestic private colleges leading to degrees at foreign universities, twinning arrangements, franchising

Mode 4: movement of natural persons. Temporary movement of teachers, lecturers, and education personnel to provide education services overseas

All 4 modes of supply are relevant to India. The mode-wise classification reflects the complex nature of international transactions in services. It brings into purview of the GATS investment, labour market, immigration policies, and wide range of domestic regulations.

Education services under the GATS:

Five sub-sectors of education come under the GATS. They are:

- primary education
- secondary education
- higher education
- adult education
- other education services

Significance of GATS for India in education services:

GATS is relevant to India's education services sector as:

- India has both export and import interests in education services across all GATS modes
- India has private presence in education services which co exists with and is in competition with public educational institutions, so carve out clause for public services need not apply
- GATS provides means to gain predictable and transparent market access conditions overseas to expand India's exports of education services
- GATS commitments could be used to facilitate participation by foreign institutions in India and increase supply of higher education to alleviate supply constraints and declining public funds
- But GATS could pose challenges to domestic regulation and autonomy in national education policies.

India has the potential to both import and export education services and its import and export interests are:

India's import interests

Mode 1: Prospects for distance education and degrees from foreign academic institutions

Mode 2: Indian students studying in foreign universities (US, UK, Australia)

- Over 40,000 studying in US courses
- Several thousand in Europe

Mode 3: Foreign institutions entering India through twinning and franchise arrangements

Indian students getting foreign degrees, doing professional courses at local branch campuses of foreign institutions in India

- UK-based Wigan and Leigh College
- Indian School of Business tie-up with Kellogg, Wharton, and London Business School
- Western International University, Arizona
- NIIT tie-up with ITT Educational Services, USA
- Tata Infotech tie-up with Hertfordshire University, UK

Mode 4: Foreign faculty and scholars teaching in India

India's export interests in education services:

Mode 1: Prospects for tele-education in management and executive training

- Experience with distance learning, use of new technologies (IGNOU)

Mode 2: Students from developing countries studying in Indian engineering and medical colleges

- Around 5,500 students from neighbouring developing countries (2001).
- Exchange programmes and twinning arrangements

Mode 3: Setting up of overseas campuses, franchised by Indian institutions

- MAHE, BITS, Central Institute of English and Foreign Languages (CIEFL)
- Over 100 CBSE schools abroad.

Mode 4: Indian teachers, lecturers teaching abroad in Middle East, Africa, researchers/scholars on visiting arrangements abroad

- Some 10,000 secondary school teachers overseas
- Recruitment of Indian teachers in Maths, Science, English
- Potential as a regional hub for exporting higher education services

But exports of educational services are constrained by:

- Resource and capacity limitations
- Inadequate infrastructure and campus facilities
- Divergence of standards within country
- Lack of certification, recognition, equivalence
- Restrictive immigration and labour market policies
- Economic needs tests
- Technology
- Lack of marketing and targeting of niche markets

There are many **Regulatory issues** to be addressed to support export interests. They are

- Obtaining international equivalence of degrees and diplomas
- Moving towards international standards and reducing divergence of standards within country
- Signing Mutual Recognition Agreements
- Introducing regulatory framework for distance learning programmes

Request-offer process and India:

- India has received requests from several countries in education services
- Australia, Brazil, Japan, New Zealand, Norway, Singapore, US
- Requests mostly focus on higher education, adult education, and other education services
- US also specified training services and educational testing services
- Brazil has also requested primary and

secondary education services

- All requests to India are for full market access and national treatment commitments in modes 1, 2, 3
- Some requests recognize need for regulation to ensure quality of education and protect consumers
- Some requests specify need for transparency in accreditation and quality assurance procedures for foreign courses/programmes

2. Gats and Opinion of Teacher Educators:

Teacher educators are the facilitators in any educational reform movement. Realizing this, the 35th session of the International Conference on Education organized by the UNESCO in 1975 firmly concluded that, whatever may be the intentions to improve or reform the education of teachers, the practical realization of such intentions will greatly depend on the quality and initiative of those called upon to participate in this activity. The teacher educator by virtue of his position and role is one of the most important agents for effective implementation of new policies for reforms of economic growth.

Teacher educators are the architects of the future teachers. Hence they themselves have to manifest all that is expected and appreciated of a teacher. One such essential attribute of a teacher is to adapt to the changing needs of the time and this attribute has to be first witnessed in the teacher educator. Since GATS and the inclusion of Education services for trade will change the way in which educational processes are carried out, the teachers have to be trained in this matter.

3. Need and Importance of the Study:

Now, there is a revolution taking place as a result of globalization and liberalization and this cannot be ignored by teachers, their educators and administrators. In order to contribute towards national development, teacher education should keep pace with the changing times and should continuously evolve itself to meet the future challenges. So do we have a choice as to whether or not to include educational services under free trade and more foreign investment and competition? The new changes brought about by GATS demand that teacher educators keep their eyes open and keep themselves abreast with the highly competitive world. The pressure is on to change or to face consequences.

The opinion they possess towards inclusion of education services in GATS agreement will influence the quality of education and this will be transmitted through them to the younger generation of teachers. Hence the investigator felt a need for investigating the opinion of teacher educators towards including Higher education under GATS.

4. Statement of the Problem:

Including Higher Education Services under GATS Opinion of Teacher Educators

5. Objectives:

The study was taken up with the following objectives:

To study the opinion of Teacher Educators towards including Higher Education Services under GATS.

6. Methodology of the Study

For conducting the study, Survey method was employed. The population for the present study were teacher educators of the Colleges of Education affiliated to Bangalore University. The sample consisted of both male and female teacher educators from selected colleges of Bangalore urban district. Stratified random sampling technique was employed to select the sample. The sampling procedure and the number of sample selected is as shown in table No. 1

Table No.1 :

Number of Sample selected belonging to different streams & gender from different colleges of Education.

Locality	Stream				Total
	Arts		Science		
	Male	Female	Male	Female	
Urban College 1	1	2	1	2	6
Urban College 2	2	1	2	1	8
Urban College 3	2	2	3	-	7
Urban College 5	2	2	3	-	7
Urban College 7	2	1	1	3	7
Urban College 8	2	1	2	1	8
Urban College 9	2	2	3	-	7
Total	13	11	15	7	46

7. Tools Used for Data Collection:

The following tools were used to collect the data for the study:

- Inclusion of Education in GATS-Opinionaire constructed by the Investigator
- A Personal Proforma

8. Issues considered in the construction of the opinionnaire:

Opinion of teacher educators was collected regarding the following issues related to inclusion of Education under GATS:

- Should India schedule education services and make commitments in this sector?
- If it does commit, what kinds of commitments and what kinds of domestic regulatory reforms would be required to ensure that national policy objectives are not undermined?
- What kinds of regulatory challenges are posed by the GATS in education services?
- Should India pro-actively seek market access in education services by making requests in future and in what areas?
- Will it have an adverse impact on quality, standards, equity, prices if do not have adequate domestic regulation and enforcement liberalization of education services?
- Will it be possible without up-gradation of infrastructure and facilities of premier domestic institutions?
- Will it result in loss of competitiveness for domestic providers and possible diversion of faculty resources and students?
- Multilateral commitments in education services should be preceded by improved regulatory enforcement of provisions concerning accreditation, standards, registration, licensing requirements and improvements in educational infrastructure in domestic institutions
- Is there an urgent need to.

- Improve enforcement of standards & quality requirements in general?
- Improve coordination among and institutional capacity within domestic regulatory and professional bodies?
- Ensure academic considerations supersede commercial ones in provision of higher education services by private suppliers?
- Reduce number of unapproved institutions to reduce scope for substandard foreign and domestic partnership arrangements?
- Allow only genuine academic institutions approved by apex bodies to participate in twinning activities?
- Prevent selling of degrees or marketing of degrees of questionable standard by non recognized institutions/even recognized institutions?
- Exercise sufficient controls over franchising arrangements to ensure supervision by parent institutions, quality, appropriate financial arrangements, and genuine institutional links?
- Take prompt punitive action where registration and other norms violated?
- Provide comprehensive information to consumers on foreign courses and institutions to enable informed choice?
- Enforce international equivalence requirements in foreign courses and programmes?
- Introduce regulations to continuously monitor long distance programmes by foreign providers?
- Upgrade infrastructure and campus facilities, increase autonomy in reputed public educational institutions to enable them to compete with foreign providers?

9. Statistical Analysis of Data:

Percentage Analysis: Percentage analysis was used to find out the percentage of teacher Educators who agree or disagree with the statements made about various issues concerned with Inclusion of education services under GATS

10. Major Findings

The major finding of the study was :

Teacher educators do not have any knowledge about GATS and Inclusion of education services under GATS and hence were not able to give any opinion about its consequences to Indian Education and issues related to it.

11. Educational Implications

Based on the findings of the study the implications it has to education is presented below:

- It is found that nearly 99% of the teacher educators do not have the bare minimum knowledge of GATS and the inclusion of education under GATS. They do not posses any knowledge about the four modes of supply that are mentioned in GATS, the issues that might come up in Indian Higher Education as a result of this, and the necessary changes that have been made in our existing system. Hence, they were not able to give any opinion about its consequences to Indian Education and issues related to it. There might be many reasons for this. One might be the process of decision making and executing the process of adaptation of new practices. Moreover it is very difficult to adapt to changes. They are more resistant to accept any change. This might be due to a sort of fear of loosing out in new competition. This attitude of teacher educators towards inkusion of education services under GATS has to be changed towards a more favourable one.
- The fear of losing out in competition to foreign competitors if education is included under GATS has to be eliminated.
- An appropriate input is necessary in the form of Workshops to give adequate knowledge to teacher educators about GATS and its consequences and related issues in Indian situation. When teacher educators have to change their mode of work it needs a lot of zeal, trust and confidence in their ability to plunge into it. This trust in their ability could be developed when they have a good knowledge of the subject. Hence teacher educators should be provided with an orientation in the subject of ICT.
- Many colleges of education do not have adequate infrastructure. This also contributes to Teacher educators not becoming well acquainted with the use of Internet and hence do not access new and updated information. Therefore adequate number of personal Computers (PCs), time and internet facility should be made available to them.
- About 2% of teacher educators have welcomed the move of including education under GATS. They feel that the competition might lead to the improvement of infrastructure in colleges in order to prove themselves to be more efficient. Younger staff agreed to accept change since they have the zeal to perform themselves by implementing the new changes. This zeal and quest for improvement should be incorporated in the senior teacher educators by motivating them to be more competitive.

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Interactive Learning Strategies and Acceleration of Life Skills

Dr. Exemmal J.

Education is one of the major devices to mould the contemporary society and to train the people to meet the current challenges in the global society. In the context of global policy and global economy, each and every country is seriously thinking of the quality of education. The quality of education can be enhanced by improving the quality of inputs and various components of teaching and learning. Companionship and support provided by friends are important for children's life skill development. A lot of research has been done on interactive learning strategies and life skill development in recent decades. Life skills are not just important in themselves also, but are linked to other desirable outcomes. Among adolescents, lack of life skills has been found to be related to depression and anxiety (Tryon et al., 2001) and low academic achievement (Elliot et al., 2002). Isolation from peers is associated with a number of social and psychological problems such as low self – esteem and perceived competence, academic failure and mental health problems (Muijs & Reynolds, 2005). In recent years, there has been a great development of strategies that help students work effective; and learning through co-operation. Interactive Learning Strategies facilitate learning across all curriculum areas and improve self esteem and life skills. It also enhance, social skills like solidarity and attainment of academic learning goals which includes the acquisition of information and skills through the modes of inquiry of the academic disciplines. According to Thelen (1954), "A substantial part of students' education should be by co-operative inquiry into important social and academic problems". Interactive learning strategies are designed to lead students to explore various perspectives on the problems and to master information, ideas, skills and social competence. Here, the teacher acts as a director and students play the role of investigators.

Interactive learning strategies (ILS) can promote various life skills. According to William and Asher (1993), four basic concepts should be emphasized in ILS (Co-operation, participation, communication and validation). It is important to start developing pupil's social skills at an early stage of development. Hartup and Moore (1950) found that if children have not developed social skills by the age 6, they are at risk of experiencing problems throughout their life. The interactive learning strategies (ILS) acknowledge that 'all learners are intrinsically linked'. Studies conducted by Hopkins (1980); Slavin (1990) and Sharan (1990) revealed that ILS can generate and enhance intrinsic motivation and can provide opportunity for social learning. Moreover, interacting with one another promotes cognitive as well as social complexity; increase rate of learning, develop positive feeling, reduce alienation and loneliness, increase intrinsic motivation, self esteem, and promote life skills.

The social models of learning emphasize social nature of individuals and how social interaction can enhance academic learning and life skills. Analysis of related literature and studies have shown that a great majority of tasks are structured for individuals (Individual task). Studies conducted by Johnson and Johnson (1950) and; Sharan (1990) revealed that individualistic pattern of learning – teaching are non-productive for individuals and for society. Moreover, it may create unnatural and unsocial climate, fail to promote and maximize the potentials of children and will decrease the rate of learning.

One of the serious criticisms levied against the existing system of education is that our system of education is not suitable to develop the life skills and other capabilities to overcome the challenges of the new millennium. The need for developing suitable interactive learning strategies to enhance various life skills is widely accepted. Lack of suitable social learning strategies, inadequate knowledge about social learning models, lack of literature and lack of practice are some of the major problems reported by teachers in connection with the use of interactive learning strategies.

Objectives of the Study

1. To prepare group investigation model (GIM) on "plant community" for standard VIII.
2. To test the effectiveness of GIM for learning the topic "plant community" in terms of:
   i) Immediate post – test Achievement.
   ii) Delayed memory Achievement
   iii) Retention (for total sample as well as sub – samples based on Sex and Locality)
3. To find out the suitability of GIM for accelerating life skills.
4. To find out the extent of use of GIM for teaching "plant community"
5. To find out the practicability of GIM for teaching "plant community".
6. To identify the practical difficulties likely to be encountered while using GIM for teaching "plant community".

Hypotheses

Ho (1) There is significant difference between GIM group and AM group with regard to immediate post test Achievement, Delayed Memory Achievement and Retention.

Ho (2) There is significant difference between:

1. Male & Female students
2. Rural and urban students, with regard to immediate

Post Test Delayed Memory and Retention.

Method

Experimental cum survey method was used

Tools for conducting the study

1. Group investigation Model on plant community for standard VIII.
2. Achievement Test in Botany (Based on plant community)
3. Rating scale for Biology teachers (Secondary level)
4. Questionnaire for teachers (Secondary school Biology teachers)

Sample

The experimental study was conducted on a sample of 80 students of standard VIII (Experimental group – GIM (N) = 40; control group AM = 40).

External Design and Procedure

The investigator adopted pretest – post test parallel group design for experimental study. The experimental group was exposed to Activity Method (AM). The entry behaviour of the students were assessed using pretest (Achievement) and Terminal behaviour was assessed by post test Achievement scores. The same Achievement test was administered to the treatment group (GIM & AM) as pre test and post test.

Major Findings

1. Comparison of the overall mean scores of the treatment groups (GIM AM – Total sample) revealed that GIM is significantly superior to AM with regard to Immediate post test Achievement (CR = 22.73; P < .01) and Delayed Memory Achievement (CR = 18.05; P < .01)

2. Comparison of the mean scores of GIM & AM on Extent of Forgetting (Retention) also revealed the superiority of GIM over AM in terms of Retention Scores (CR = 12.83; P < .01)

The t – test between the Means of Immediate post test Achievement, Delayed Memory Achievement and Retention scores of the sub – samples of treatment groups (GIM & AM) revealed that variables SEX and LOCALITY do not have any significant influence on Immediate post – test achievement, Delayed memory achievement and Retention scores.

Regarding the suitability of GIM in accelerating LIFE SKILLS, all the teachers (100%) recorded that GIM is suitable to a great Extent in promoting interaction among students. It is followed by promoting students participation in learning activities (93.33%) enhancing teacher pupil interaction (93.33%); establishing friendship (91.66%) acting responsibly (80.33%), developing communication skills (85.00); promoting leadership, working co-operatively (81.66%), working independently (181.66%) positive interdependence (68.33); developing self esteem (58.33), promoting caring relationships (50.0%).

As regards. the extent of use of GIM for teaching "Plant community" 8.33% of teachers reported that they are using GIM (often) and 91.66% of teachers reported that they are not using GIM for teaching "plant community".

Regarding the practicability of GIM for teaching "plant community", a great majority teachers (93.33%) recorded that GIM is practicable to a great extent for teaching plant community.

Analysis of the practical difficulties likely to be encountered by teachers, while using GIM for teaching identified, the following difficulties: Lack of suitable GIM models (100%); lack of literature (93.33%); lack of practice (93.33%) Rigid time table (81.66%), Rigid examination system (61.66%)

Discussion

The results of this study indicated that interactive learning strategy (ILS) is effective in terms of Immediate post test and delayed achievement. The study also showed that ILS is suitable to enhance various life skills. The synergy generated in co-operative settings generates motivation and can produce cognitive as well as social complexity. Moreover, academic learning can not be separated from social atmosphere in which it takes place. Since children are engaged in group work and group thinking, they are bound to affect each other

The findings of this study may enlighten the educational authorities, curriculum planners and teaching community to design suitable interactive learning strategies across the curriculum to promote various life skills, intellectual capabilities and academic attainments. The social learning situations and experience may help students to generate interest and provide chances to learn from one another through group interaction and group thinking.

The intellectual capabilities, life skills and academic proficiency, gained through social learning and divergent responses, will enable the learner to become more reflective and rational in life situations. Moreover, the learners will be able to see the problems and critical situations from different angles and will be useful to meet the challenges of the new millenium with greater independence and confidence.

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Influence of Study Habits and Intelligence on Acquisition of Biological Concepts of Students' at Secondary Level

Dr. P.J. Jacob B.
Dr. Josemon P. George

Abstract

The present study has been conducted on a stratified sample of 800 secondary school students. A 'study habit inventory', a 'test of biological concepts' and an 'intelligence test' were used to collect data. The statistical techniques adopted are t test, Pearson's product moment correlation and multiple regression analysis. The results revealed significant relationship between and among acquisition of biological concepts, study habits and intelligence. It is also found that study habits have a higher influence than intelligence on acquisition of biological concepts among the secondary school students.

Introduction

Concepts are the basic units of all types of learning. Proper understanding of the basic concepts in a particular subject and the ability to apply these concepts in different situations are important factors determining a pupil's achievement in the subject.

Different concepts in Biology related to personal hygiene and healthy food habits developed in the early stages of learning have lasting impact on the child throughout his life. Higher-level concepts in Biology acquired by the pupil in the secondary school level also have very high transfer value and find much application in different stages of life compared to other science subjects. There are apparent individual differences in pupils with regard to their ability to conceptualize. But it is influenced by a no. of psychological and social variables such as intelligence, study habits etc.

A comprehensive study intended to identify these important variables, which influence a child's academic achievement, and the related pattern of behaviour has not yet been taken up under Indian conditions. Knowledge related to this important area of education is mainly obtained from the studies conducted in western countries, where the nature and method of interaction of these variables, type of sample selected etc. are highly dissimilar. The knowledge obtained from a study under Indian condition would be of much value in obtaining a theoretical understanding of the extent of the influence of these variables on academic achievement at school level. It may be also useful to design the instructional practices, which are most suited and relevant to the varied learning situations.

Objectives

The study was conducted with the following objectives;

1. To find out the significance of difference in the acquisition of biological concepts between high, medium and low group in study habits and intelligence.
2. To understand the significance of relationship between the acquisition of biological concepts and study habits and intelligence for the total sample and sub samples of secondary school students.

3. To determine the influence of study habits and intelligence on the acquisition biological concepts of secondary school students.

Hypotheses

Based on the above objectives, following hypotheses has been formulated.

1. There is significant difference in the acquisition of biological concepts between high, medium and low group in study habits and intelligence
2. There exists significant positive relationship between the acquisition of biological concepts and the study habits for the total sample and sub samples of secondary students.
3. There exists significant positive relationship between the acquisition of biological concepts and intelligence for the total sample and sub samples of secondary school students.
4. The study habits and intelligence have significant influence on the acquisition of biological concepts of secondary school students

Method

Normative survey method was used in this study.

Sample

A total sample of 800 secondary school students was selected using stratified random sampling technique from 20 secondary schools in Ernakulam district of Kerala. Equal number of boys, girls, urban and rural school students were included in the sample.

Tools

The study was conducted with the help of a study habit inventory, a test biological concepts and an intelligence test.

Statistical Techniques

Multiple regression analysis (Table 3), Pearson's product moment correlation (Table 2), and t test (Table 1) were employed for the analysis and interpretation of data and testing of hypotheses.

Discussion of Results

The data was analysed to find answers to the hypotheses set for the study. The major findings and discussion are presented as follows.

Table-1

Comparison between Sub samples: Data and Results

Variables	Groups	Score of Test of Biological concepts			't' value between Low and Medium	't' value between Low and High	't' value between Medium and High
		Mean	S.D	N			
Intelligence	Low	17.83	3.78	299	22.102**	40.583**	22.371**
	Medium	24.83	3.75	316			
	High	32.49	4.14	225			
Study habit	Low	17.92	3.60	280	25.667**	45.011**	23.24**
	Medium	25.25	3.42	290			
	High	32.04	3.77	227			

** Significant at 0.01 level

Difference in Acquisition of Biological Concepts by Different Samples of Study Habits and Intelligence.

Table 1 shows that the t values for significance of difference in mean scores of acquisition of biological concepts between low, medium and high group in study habits and intelligence are significant at 0.01 level. And therefore the hypothesis 1 is substantiated.

Pearson's product moment coefficient of correlation and related details presented in Table 2 show that there is significant positive relationship between acquisition of biological concepts and study habits. All the 'r' values obtained are showing substantial to very high relationship. Hence hypothesis 2 is also substantiated fully. Similar results are obtained by Alparslan, Tekkaya and Geban (2003), Nancy(2002) and Sroiv(2004).

Pearson's product moment coefficient of correlation and other related details presented in Table 2 also shows that there is significant positive relationship between acquisition of biological concepts and intelligence. All the 'r' values are showing substantial to high correlation between the two factors. Hence hypothesis 3 is also accepted. The findings of Pillai and Kumar (1996), Manjulata (1993) and Kalle and Sharma (1990) also suggested that there is significant relationship between different forms of academic achievement and intelligence.

Table-2

Relationship between Acquisition of Biological concepts and study habits and Intelligence

Sub sample		'r'	Percentage of Overlap	N
Intelligence	Low	0.677	39.25	259
	Medium	0.505	25.50	316
	High	0.674	45.30	325
Total		0.892	79.56	900
Study habit	Low	0.709	50.25	202
	Medium	0.738	54.40	280
	High	0.581	33.74	427
Total		0.900	82.50	900

Table 3

Result of Multiple Regression Analysis – Showing the Influence of the Study habits and Intelligence on Acquisition of Biological Concepts.

	B	Std. Error	Sig.	Beta Weight	r	Beta Weight X 'r'
Constant	-24.584	1.300	0.000			
Intelligence	0.307	0.024	0.000	$\beta_{12.y}$ = 0.337	r_{12} = 0.692	$\beta_{12.y} r_{12}$ = 0.2738
Study habits	0.173	0.016	0.000	$\beta_{y.12}$ = 0.305	r_{y2} = 0.509	$\beta_{y.12} r_{y2}$ = 0.2778

Influence of Study habits and intelligence on Acquisition of biological concepts

The above table shows that study habits and intelligence are having significant impact on biological concepts (significance at 0.05 level). The Beta coefficients (β) are positive. It can be seen that every unit change in the score of test of intelligence contributes 0.307 units increase in the score of test of biological concepts. For every unit change in the score of study habits inventory, there will be 0.173 units increase in the score of test of biological concepts. The multiple regression equation derived can be used to predict the biological concepts score of the pupil using these variables. The multiple regression equation can be written as follows.

Biological concept score (BC) = -24.584 + 0.307 x_1 +0.173 x_2

Where, x_1 = score for intelligence test, x_2 = score for study habits inventory.

The $\beta_{12.y} r_{12}$ 0.2738 shows that 27.38% of variance in score of acquisition of biological concepts is attributable to intelligence. While $\beta_{y.12} r_{y2}$ 0.2778, shows that 27.78% variance in the score of acquisition of biological concepts is attributable to study habits. Thus it can be concluded that study habits have highest influence on acquisition of biological concepts of secondary school students.

Multiple regression analysis was also done to find out the influence in the score of test of biological concepts by the study habits and intelligence (classified into high, medium and low) The multiple regression equation obtained can be written as follows.

Biological concepts score (BC) = 33.703 - 3.411 x_1 −1.751 x_2 − 4.732 x_3 − 2.089 x_4

Where, x_1 – score of low intelligence group in intelligence test, x_2 = score of medium intelligence group in intelligence test, x_3 = score of low study habits group in study habits inventory, x_4 = score of medium study habits group in study habits inventory.

This result shows that the low scorers on intelligence have 3.411 units less score in biological concepts than high scorers in intelligence and the medium scorers in intelligence have 1.751 units less score than high scorers in intelligence. Pupil with low score in study habits have 4.732 units less score in biological concepts score than the high scorers in study habits and the medium scorers in study habits have 2.089 units less score than high scorers in study habits. Based on these findings hypothesis 4 is accepted.

Conclusion

The present study revealed following significant conclusions with respect to the acquisition of biological concepts of secondary school students in relation to their study habit and intelligence.

The secondary school students who are high, medium and low scorers in study habits and intelligence showed significant difference in their acquisition of biological concepts.

There is a positive significant relationship between acquisition of biological concepts and study habits and intelligence of secondary school students for total sample and sub samples.

Multiple regression analysis showed significant influence of study habit and intelligence on acquisition biological concepts. The results show that study habits is having a higher influence than intelligence on the acquisition of biological concepts of secondary school students.

Educational Implications

Secondary school students with varying levels of study habits and intelligence do differ in their acquisition of biological concepts. Study habits and intelligence are highly influencing the concept acquisition in biology. Since study habits is having a higher influence suitable

measures must be adopted to improve the study habits of secondary school students

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A Study on the Learning Styles of Upper Primary Students' in the Perspective of Kolb's Experiential Learning

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Sunila Thomas

Abstract

The study investigates the various learning styles (based on Kolb's Experiential learning style) exhibited by pupils at upper primary level. The study also advocates grouping of students based on their preferred learning styles. The findings of the study will definitely help teachers to match learning tasks with learning styles of students and design the curriculum accordingly. The standardized learning style inventory designed by the investigators can be adopted in schools to identify the major learning styles of students.

Introduction

A significant shift has occured over the past fifteen years in our understanding of how learning takes place. Recent works on cognitive and constructivist psychology show learning in terms of networks with connection in many directions not as an external map that is transported directly into the students head. Rather, it appears to be a part of an organic process of reorganising and restructuring as the student learns, suggesting that learning is a process of knowledge construction (Driver et al.,1985). Learning occurs not by recording information but by interpreting it, so that teaching is seen not as direct transfer of knowledge but as an intervention in an ongoing knowledge construction process.

Learning according to Caroline (1999) is that reflective activity which enables the learner to draw upon previous experience to understand and evaluate the present so as to shape the future action and formulate new knowledge.

As the process of learning in children has gained momentum in this millennium, it becomes the need of the hour to go into a deeper analysis of how children learn. Individuals differ in how they learn (process) as well as what they learn (outcome). Effective learners are usually able to describe their preferred ways of taking in and processing information. Each of us have a special way of learning that suits us best and that if we are able to learn techniques that correspond with our preferred learning style, then that learning becomes faster, more enjoyable and more effective.

Much of the recent research regarding learning focuses on learning styles and teaching styles. Hawk and Shah (2007) are of the opinion that faculty are likely to reach only some of the students in a given course, if they assume that all students learn the same way or one teaching approach will suit all students. Thus the faculty who are consciously aware of their student's learning styles as well as their own, are in a position to make informed choices in course material and design learning processes to broaden in the opportunities for effective learning in their courses.

Learning style, according to Dunn and Dunn (1993), is "the way that students begin to

concentrate on, process, internalise, and remember new and difficult academic information. They are of the view that given responsive environment, resources and approaches, students attain statistically higher achievement.

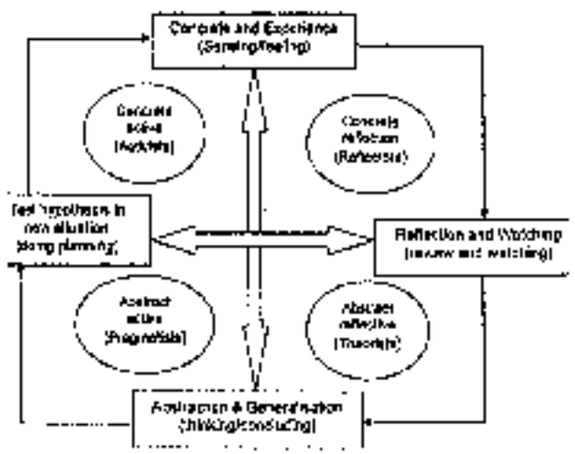
According to Duff (2004), learning styles are characteristic, cognitive, affective and physiological behaviours that serve as relatively stable indicators of how learners perceive, interact with and respond to the learning environment.

One of the most clearly elucidated theories of the learning styles is that of Kolb (1984) according to whom learning style can be ranked along a continuum running from

1. Concrete Experience (learning from the feeling and being involved in experiences) **Through**
2. Reflective observation (learning by watching and listening, looking for meanings and viewing issues from different perspectives) and
3. Abstract conceptualization (learning by creating theories and logically analyzing ideas and planning systematically) **to**
4. Active Experimentation (learning by doing, influencing people and events through action)

Kolb's learning style theory is based on John Dewey's emphasis on the need for learning to be grounded in experience, Kurt Lewin's work that stressed the importance of a person's being active in learning and Jean Piaget's theory on intelligence as the result of the interaction of the person and the environment.

Kolb's four stage theory is based on model with two dimensions. The first dimension as shown in the model below, runs horizontally and is based on task, with its right end focussing on watching/observing the tasks and the left end on doing/performing the tasks. The second dimension runs vertically and is based upon our thought and emotional processes.



Kolb's Experiential Learning Style

The horizontal and vertical lines intersect each other and form four quadrants which form the personal learning styles - Theorists, Pragmatists, Activists and Reflectors. The basic characteristics of each learning style and the career most suitable for them are as given below

Theorists:- like to learn using abstract conceptualization and reflective observation (lecture, papers, analogies). Their strengths lie in their ability to create theoretical models. They tend to be less interested in people and less concerned with practical applications of knowledge. Theorists are most suitable in Research and Planning Departments. This learning style is more characteristic of basic science and mathematics than applied sciences.

Pragmatists:- like to learn using abstract conceptualization and active experimentation (laboratories, field work and observations). Their greatest strength is in the practical application of ideas. They do not learn well from concepts or events which seems distant from their own reality. They quite often choose to specialize in Physical Sciences.

Activists:- like to learn using concrete experience and active experimentation (simulations, case study, homework). Their strengths lie in doing things and involving themselves in new experiences. They like to tackle problems by brainstorming. They are usually good at marketing and sales.

Reflectors:- like to learn using reflective observation and concrete experience (logs, journals, brain storming). They do not prefer to be rushed into things without proper opportunities to learn. They prefer to listen and observe others before giving out their suggestions. People with this learning style tend to become Counsellors, Organizational Development Specialists and Personnel Managers.

It is to be noted that we learn from all the four styles but one of the four is our favourite.

Based on Kolb's Experiential learning, a study was conducted to find out the learning modalities of upper primary students of Central Travancore in Kerala.

The main objective of the study was

1) **To educe the various learning styles exhibited by pupils at upper primary level.**
2) **To develop an appropriate strategy for grouping pupils in schools.**

For this purpose, a learning style inventory comprising of 40 items was developed and standardized by the investigators. It was administered to a sample of 288 upper primary students of seven schools from Pathanamthitta, Kottayam and Alappuzha.

The analysis of the data thus collected reveal that around 20% of the students selected are **Activists** who are intuitive in nature as they have sudden insights and gather information unsystematically. They work well in groups.

It was noted that 30% of the students are **Pragmatists** who rely more on practical application of a concept. As they are not good at abstract conceptualization, they usually depend on others for information. They prefer to be shown how things work rather than trying out themselves.

Nearly 35% of the students selected for the study are **Theorists** who prefer detailed information and are systematic. They are more theory oriented and are able to tackle abstract ideas.

Only a few students are **Reflectors** who think divergently on multiple solutions (15%). They usually make use of their visual or auditory senses to learn. The inventory also indicated that some students have more than one learning style.

The study also focussed on grouping

students according to their preferred learning modalities. When the students were made to learn in their preferred learning styles, there was noted change in their performance.

The table and graphical representation given below substantiate this finding

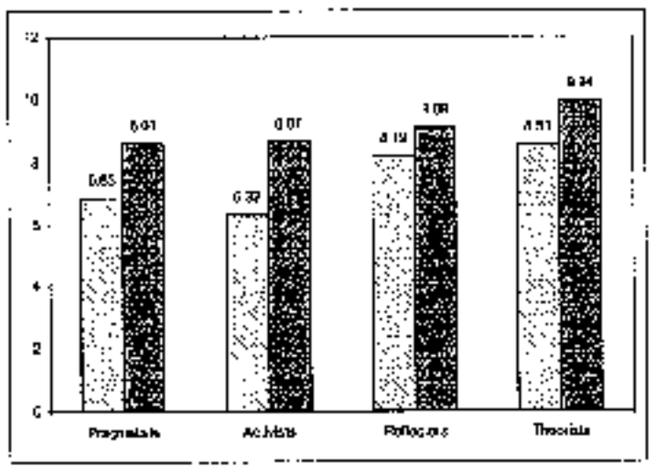
each other better than to those with different learning styles. This finding is in confirmity with the research findings of Roberts (2001) Dunn (2001) and Schering (1999).

It was found that Activists and Pragmatists performed well in groups. The Theorists and Reflectors were able to tackle abstract concepts

Table-1

Data depicting preferred learning modalities and the corresponding change in Performance

	Learning style			
	Pragmatists	Activists	Reflectors	Theorists
Pre score	6.86	6.32	8.19	8.53
Post score	8.61	8.67	9.08	9.94



Graphical representation of the preferred learning modalities and the corresponding change in performance : A comparison

The above results give a self-explanator evidence that students perform much better when they are grouped according to their learning styles, which means that students with the same learning style can convey ideas to

effectively than Activists and Pragmatists.

Present study highlights the necessity of exposing Pragmatists and Activists to the learning styles of Reflectors and Theorists for better performance.

Conclusion

The study reflects that Kolb's experiential learning style model is the most suitable learning style that can be utilised in schools for developing the perceptual modality, information processing and efficacy of an individual for perceiving, organising and retaining information.

The study shows that students can be categorized according to the learning style and that learning style of an individual has an impact on his performance. The findings of the study will definitely help teachers to match learning tasks with learning styles of students and design the curriculum accordingly.

Implications of the Study

Identification of the learning style preferences will be helpful for a teacher to design everyday classroom transactions.

If the materials to be learned are reached to the learners through the preferred styles for which the learners predisposed, learning will be highly effective

If teachers are made aware of the learning styles of students, they can alter their teaching styles accordingly and thereby develop appropriate thinking styles among learners

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Multi-Media Approach – An Effective Instructional Strategy at Higher Secondary Level

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Introduction

In this age of information technology, knowledge explosion is taking place rapidly in every sphere and new media are being extensively used for transmitting information. Over the last few decades, computers and communication technologies have had a significant impact on the ways in which we learn, teach, communicate and gain access to information. In recent years, media assume an increasingly important role in every aspect of instructional planning and design.

The teacher who chooses the media should keep in mind the pedagogic relevance, the availability of the technology and the cost-effectiveness of the media selected. The effectiveness of any medium depends on the creativity of the teacher using it. Behavioural objectives, performance objectives, learning outcomes, content, sequence and strategy are instructional task criteria most commonly used by instructional technologies to guide media selection and production.

Effective use of relevant educational technology and identification and utilization of apt, appropriate and adequate instructional aids play a significant role in making learning interesting, comprehensible and child centred.

Need for the study

In recent years, increases in class size, the diversity of student populations and changes in the expectations of students have all acted as stimuli for an examination of approaches to teaching and learning (Saunders, 2000). Coupled to developments in information and communication technology, these stimuli have generally led to different and more flexible approaches to learning, often involving the increased use of information and communication technology in the classroom. (Collis and Moonen, 2001; Hudson et al., 1997; Saunders et al., 1999).

Recent developments in technology have given teachers a way of providing students with material that seems to be improving student attitudes, motivation, understanding, transfer, equity and responsibility for one's own learning. The avenue for implementing these instructional and educational ideas has been paved by advancements in multimedia technology. Generally multimedia is the use of a variety of resources for obtaining information about a particular topic. Teachers are discovering ways to spark student's interests and motivate them to discover by incorporating a wide variety of software designed classroom presentations that are visually descriptive and relevant to the content material. Students are becoming more involved in the learning process by exploring multimedia.

Students of today have been raised in a society that is dependent on television, video games, computer software, and most recently, the internet. If classroom teaching methodology continues to follow the traditional path-

way, we are likely to see a continued decline in the academic progress of our children, because the inherent technology based learning styles of today's students diverge from the out-of-date teaching styles of the instructors (Weinraub, 1998).

The problem that all educators invariably encounter in teaching different subject, at different grade levels of our educational system, is, how to teach a lesson to a class that consists of students with different skills, learning pace and learning styles. Another challenge in education is to make learning more effective, interesting and exciting and less time consuming.

Moreover, rapid technological and industrial modernization and development in our country, in future, would demand specialized and skilled manpower for varied employment opportunities. To meet these demands, the traditional classroom is either to be replaced or improved to suit the demands of the scientific civilization. Though lack of finance is one of the major hurdles in our country, careful planning would lessen, even if not completely eradicate the burdens and difficulties.

In our country, the educators, planners and administrators are very much after the educational use of computers. It is worthwhile at this juncture to consider that in a developing country like ours, the government may not be able to provide enough computer equipments for each child to have efficient access to it. Hence the investigator felt the need of studying the effectiveness of multimedia approach by using technological advancements other than computers. So the present study is an attempt to develop multimedia packages in Biology for class XII that incorporated the audio, visual and print media along with the psychological principles of learning.

Objectives of the Study

- to compare the effectiveness of Multimedia Approach I with that of Conventional Lecture Method in teaching biology at Higher Secondary level.

- to compare the effectiveness of Multimedia Approach II with that of Conventional Lecture Method in teaching biology at Higher Secondary level.

- to compare the effectiveness of Multimedia Approach I with that of Multimedia Approach II in teaching biology at Higher Secondary level.

Method of Study

In this experimental study, the investigators have adopted the Pre-test-Post-test Non-equivalent-Group Design. Three non-equivalent intact classroom groups are made use of in which two groups as Experimental Groups and one as control group. To compensate for the lack of equivalence among the groups, the technique of Analysis of co-variance is applied (ANCOVA).

In the present study, three levels of treatments of the instructional strategy (Independent variable) namely Multimedia Approach I, Multimedia Approach II and Conventional Lecture Method are selected. The dependent variable is the achievement in Biology as determined by the achievement test scores on the topic "Circulation of Body Fluids".

The students from three divisions of standard XII of St. Ephrem's Higher Secondary School, Mamanam, Kottayam were selected as sample. Initially 150 students (50 each) from the three classes were selected. But due to the absence of some students either in the pre-test or in the post-test or during the course of experimental study, the sample size was reduced to 120 (40 each). These three groups are then randomly assigned to treatments; one was selected as Control Group and the other two were taken as Experimental Groups.

For the purpose of present study the investigator prepared the following materials based on the Biology topic "Circulation of Body

Fluids" of Standard XII at higher secondary level.

Teacher Assisted study module
Audio lessons
Projected Transparencies
Achievement Test

Procedure

The present study was experimental in nature, and the investigator has adopted the Pre-test Post-test Non-equivalent Group Design which consisted of two experimental groups and one control group. As a prerequisite for the actual experiment, the investigator administered a pre test for all the three groups. The three groups were then taught through three different methods. The Experimental Group I was given treatment through teacher assisted modular lessons and projected transparencies and Experimental group II with audio lessons and projected transparencies. The control group was taught using the conventional Lecture Method. All the three groups were given equal attention during the course of the experiment. Immediately after the completion of the experimental work, the investigator administered the same achievement test as post-test to all three groups. The scores obtained were then subjected to statistical analysis.

Since the study was intended to test the effect of Multimedia Approach on the achievement in Biology, it became indispensable to use different statistics to find out whether there is any significant difference between the pre-test and post-test scores of pupils in the Experimental and Control groups. The different statistical techniques employed were Mean, Median, Mode, Quartile Deviation, Standard Deviation, Skewness, Kurtosis, Critical Ratio and Analysis of Covariance.

Conclusions Based on Findings

The major conclusions based on the statistical analysis of data, obtained from the triangulate comparison of Multimedia Approach I, Multimedia Approach II, and Conventional Lecture Method is formulated under the following heads.

Multimedia Approach I, Consisting of Teacher Assisted Modular Lessons and Projected Transparency is More Effective than Conventional Lecture Method in the Achievement of Higher Secondary Students in Biology

This conclusion is substantiated by the following findings of the study.

The mean posttest scores of Experimental group I that was taught through Multimedia Approach I is found to be higher than that of the Control group which was taught through Conventional Lecture Method (M_1 = 19.23, M_2 = 14.425). This throws light on the effectiveness of Multimedia Approach I in teaching Biology over the Conventional Lecture Method.

The Critical Ratio of mean values of posttest scores of Experimental Group I and Control group (CR = 4.93; P<0.01) indicates that the Experimental Group I has significant improvement in their achievement after the experiment. This vouches the advantage of Multimedia Approach I over the Conventional Lecture Method.

The gain scores of the Experimental Group I and Control Group, when subjected to the analysis of Critical Ratio (CR = 5.3596; P<0.01) showed that there is significant difference between their achievement on the mean gain scores (M_1 = 14.6; M_2 = 9.65). This data testifies to the advantage of Multimedia Approach I over the conventional method.

The analysis of variance of pretest scores and posttest scores of pupils in Experimental group I and Control group showed that there is significant difference between the two groups (F_{xy} = 22.57; P<0.01). This also vouches for the effectiveness of Multimedia Approach I.

The analysis of covariance of pretest and posttest scores of pupils in Experimental group I and Control group showed that there is significant difference between the means of the posttest scores of the two groups (F_{xy} = 22; P<0.01). This implies that the Experimental Group I excels Control Group in achievement.

The 't' value for adjusted mean achievement of Experimental Group I and Control Group ('t' = 4.95; P<0.01) were found to be significant at 0.01 level. This reflects that the adjusted mean achievement scores of the group taught through Multimedia Approach I differ significantly from the adjusted mean achievement scores of group taught through conventional lecture method. The adjusted mean achievement of the Experimental group I is 18.96, which is significantly higher than that of the Control group, whose adjusted mean achievement is 14.35. Thus the students of the group taught through Multimedia Approach I gained significantly higher scores than those taught through Lecture Method. This confirms the supremacy of Multimedia Approach I over the Conventional Lecture Method.

Multimedia Approach II, Consisting of Audio Lessons and Projected Transparencies is More Effective than Conventional Lecture Method in the Achievement in Biology of Higher Secondary Students

This conclusion is substantiated by the following findings of the study.

The posttest scores of Experimental group II (E_2) that was taught through Multimedia Approach II found to be higher than that of the Control Group which was taught through Conventional Lecture Method. (M_1 = 17.65, M_2 = 14.425). This throws light as the effectiveness of Multimedia Approach II in teaching Biology over Lecture Method.

The Critical Ratio of mean values of posttest scores of Experimental group II (E_2) and Control group (CR = 4.93; P<0.01) indicates that the Experimental Group II has significant improvement in their achievement score in Biology after the experiment. This vouches the advantage of Multimedia Approach II over the Conventional Lecture Method.

The gain scores of the Experimental Group II and Control group, when subjected to the analysis of Critical Ratio (CR = 0.39; P<0.01) showed that there is significant difference between their achievement scores of the Mean Gain Scores, (M_1 = 13.3 and M_2 = 9.65). This data testifies to the advantage of Multimedia Approach II over the Conventional Lecture Method.

The analysis of variance of pretest scores and posttest scores of pupils in Experimental group II and Control group showed that there is significant difference between the two groups (F_{xy} = 9.5706; P<0.01). This also vouches for the effectiveness of Multimedia Approach II.

The analysis of covariance of pretest and posttest scores of pupils in Experimental group II and Control group showed that there is significant difference between the means of posttest scores of the two groups (F_{xy} = 8.289; P<0.01). This implies that the Experimental group II excels Control group in achievement scores of Biology.

The 't' value for Adjusted Mean Achievement of Scores in Biology of Experimental Group II and Control Group ('t' = 2.58; P<0.01) were found to be significant at 0.01 level. This reflects that the adjusted mean achievement scores in Biology of the group taught through Multimedia Approach II differs significantly from the adjusted mean scores of group taught through Conventional Lecture Method. The adjusted mean achievement scores in Biology of the Experimental Group II is 17.596, which is significantly higher than that of the Control group, whose adjusted mean achievement score in Biology is 14.29. Thus the students of the group taught through Multimedia Approach II gained significantly higher scores in Biology than those taught through lecture method. This confirms the supremacy of Multimedia Approach II over the Conventional Lecture Method.

Consolidated Result of Analysis of Co-variance of Pretest and Posttest Scores of Experimental Groups I and II) and Control Group

Groups	Source of Variation	df	SS_x	SS_y	SS_0	SS_1	MS_1	SD_1	F_1	Level of Significance
Experimental group I and Control group	Among group mean	1	1.5125	458.029	26.6282	490.640	140.642	4.07267	22.00	P<0.01
	Within group mean	77	209.79	1517.319	175.351	1472.262	19.120295			
Experimental group II and Control group	Among group mean	1	0.4813	232.936	10.6541	217.77	217.77	5.1256	8.959	P<0.01
	Within group mean	77	197.221	2118.642	133.1536	2302.911	96.275			

Multimedia Approach I, Consisting of Teacher Assisted Modular Lessons and Projected Transparencies is Equally Effective as Multimedia Approach II, Consisting of Audio Lessons and Projected Transparencies in the Achievement Scores of Higher Secondary Students in Biology

This conclusion is substantiated by the following findings of the study.

The Critical Ratio of the mean values of posttest scores of Experimental Group I, which was taught through Multimedia Approach I, and Experimental Group II which was taught through Multimedia Approach II (CR = 1.58; P>0.05) is not significant even at 0.05 level. This throws light on the equal effectiveness of Multimedia Approach I and Multimedia Approach II in the achievement scores of Higher Secondary Students in Biology.

The Gain Scores of the Experimental Group I and Experimental Group II, when subjected to the analysis of Critical Ratio (CR = 1.413; P>0.05) showed that there is no significant difference between their achievement in the mean gain scores of Biology. This confirms the equal effectiveness of Multimedia Approach I and Multimedia Approach II in the achievement scores of Higher Secondary Students in Biology.

Educational Implications of the Study

The results of the study have proved that Multimedia Instructional Strategy is more effective than the Conventional Lecture method in teaching Biology at Higher Secondary Level. It is found that students enjoy learning through Multimedia. So teachers should incorporate Multimedia Instructional Strategy in terms of techniques, methods and materials in the process of teaching learning.

From this study it is clear that Multimedia is not a product but a combination of technologies. When a teacher is teaching he can add a variety of information through the effective use of sound, colour images moving pictures etc. In this way the teacher can help the learner to understand the difficult concept clearly.

Since cognition and conceptualization depend on a chain of events, which begin, with the learner's perception of stimuli like auditory, visual, tactile and olfactory, it is important that these initial learning experiences should be accurate, dependable and understandable. So teachers should pay greater

attention while choosing the media for instruction. Moreover, they should critically examine the interaction of images, sounds and written words in learning the link between what is heard and what is seen.

Teachers should be given orientation as to how to develop multimedia packages, making use of the resources locally available to teach biology both at school and college level. This will give a better preparedness to ensure optimum human resource development.

Keeping the results of the study in mind, the agencies to improve the quality of education should take up the task of developing multimedia packages including audio-lessons, modular lessons and projected visuals for all the subjects. Since almost all the schools have adequate facades, it can be properly made use of.

For the development of audiocassettes, modular lessons and projected visuals NCERT and SCERT can make use of the service of outstanding teachers at the national as well as the state level so that the expertise of the meritorious teachers can be made available even to the students in far flung areas.

The study provides an excellent evidence of the effectiveness of modular lessons for teaching biological concepts. Generally, students become unable to understand the phenomenon just because they have not understood the basic concepts behind it. By using this type of learning material, teachers can improve the understanding and knowledge of the students in any subject. Even in the absence of the teachers, these types of programmes can engage the students and prevent the wastage of their time. Moreover, the individualized instruction might cope-up with the shortage of effective teachers also.

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Integrated Instructional Paradigm for Enhanced Dictionary Skills in English at Secondary Level

Dr. Jaya Daise &
P. C. Chacko

Abstract

An examination of the dictionary skills of secondary school students revealed that very little has been acquired by them in this vital area. Intervention with the Integrated Instructional Paradigm brought forth excellent results underscoring the relevance of the experiment.

Introduction

An English dictionary is a student's main source of information when lacking human help. The dictionary has the potential to provide self-teaching opportunities to improve reading, spelling and general phonological skills. Thus acquisition of dictionary skills is indispensable for the acquisition of language skills and it is worth tapping the innate desire for a reference work by showing students how. In effect, a well-designed dictionary can be of great benefit to them.

Functions of dictionaries

Most dictionaries

- provide access to word meanings, word pragmatics and word collocation: Words and phrases most often find meaning in situations of use. Many of the most used words often express meaning that are quite different from what they mean in isolation – they may express the speaker's feelings, prejudices and preferences. Word pragmatics provides cues to such speaker meanings. Words also gain new meanings in the company of other words with which they are frequently used. Such a habitual coming together of words is called word collocation.
- give information about various grammatical details: A dictionary entry normally provides one or more grammar labels to indicate the word's part(s) of speech.
- offer guidance on the pronunciation and accent of words and show the sounds that make up a word: Different dictionaries use different pronunciation keys composed of words with diacritical marks. To know how to pronounce a word in a particular dictionary, students must familiarize themselves with the pronunciation key in that dictionary.
- furnish guidance on appropriate language use in significant situations: An aspect of language use that has of late been receiving considerable attention is appropriacy. Language varies significantly from situation to situation. It also varies in the same situation depending on who uses it and with whom – the speaker's and listener's status, age, purpose and the medium (oral or written) used.
- create awareness with regard to the status and style labels of words in the form of cautionary labels: Status or style labels show how the use of a particular word or meaning is limited to certain types of speech or writing and, in some cases, to certain parts of the user's world – usually in the form of cautionary labels.

Students' use of dictionaries

Children use picture dictionaries (pictionaries) at the primary school level more as an aid to writing than for vocabulary expansion. If young readers discover the wonders of the dictionary, they can enrich their vocabulary. A learner needs the dictionary not just for technical, specialist, foreign, or rare words, but more for the multiple meanings, uses and pronunciation of much used common words. The dictionary, therefore, serves as a reliable guide for both comprehension and production of language. When students recognize the power of words and their ability to have different meanings based on their contexts, they start building a vocabulary consciousness. This vocabulary consciousness grows and matures when students independently search out word meanings. There is a need to build a sizable vocabulary in order to communicate effectively. Naturally the acquisition of dictionary skills is the best means to this end. This underscores the relevance of dictionary training in any learning situation and hence should form an integral part of any syllabus. Researches have indicated that students are likely to have many erroneous ideas about the dictionary and little understanding of how to use it correctly. Therefore it is important to teach students the dictionary skills.

Teaching dictionary skills

The use of a dictionary as a self-study material is quite often underestimated. It is the duty of the teacher to provide students with occasion for optimizing the use of the dictionary in the classroom. To develop dictionary skills among students, it is necessary to make them

- ✓ familiar with the feel of the dictionary;
- ✓ follow the guide words provided at the top of each page indicating the first and last words on that page in the dictionary;
- ✓ look up words and find the necessary information;
- ✓ learn more about words and language;
- ✓ use the extra information about words and language;
- ✓ understand the way pronunciation is shown in the dictionary;
- ✓ know that dictionaries are valuable sources of phrases and idioms; and
- ✓ explore extra information provided on aspects of English such as correct usage, common errors, synonyms, metaphors and difference between American and British English.

No pupil can make use of a dictionary unless (s)he is familiar with these reference skills.

Most of the studies on dictionary use have been conducted in western countries where English is taught as the first language, but very little has been done in our country so far in this vital area of language skill. The dictionary skills have long been neglected by our teachers and students alike, the reasons for which are yet unidentified. Probably, the dictionary and the acquisition of dictionary skills must have been taken for granted. However, one has to acknowledge the fact that acquisition of dictionary skills is a necessary pre-requisite for the acquisition of a second language. The present study attempts to find out the level of dictionary skills possessed by secondary school students and to assess the effectiveness of an Integrated Instructional Paradigm for the enhancement of these skills.

Definition of key terms

The key terms as used in the title are defined below.

- *Integrated Instructional Paradigm* indicates a combination of different strategies intended for instruction

- *Enhance* means increase in strength or amount.
- *Dictionary skills* refer to the special ability to use the dictionary for the extension of vocabulary and for reference.
- *Secondary level* comprises standards VIII, IX and X of the schools in Kerala.

Variables of the study

In the present study, the Integrated Instructional Paradigm is the independent variable, while the acquisition of dictionary skills in English of secondary school students is the dependent variable.

Hypotheses

It was hypothesized that

1. Dictionary skills in English are minimal at secondary level,

   and

2. The Integrated Instructional Paradigm is effective in enhancing dictionary skills in English at secondary level.

Objectives of the study

The objectives of the study were

1. to measure the level of dictionary skills in English possessed by students at secondary level.
2. to measure the extent of dictionary skills in English acquired by the students after the experimental treatment.
3. to assess the effectiveness of Integrated Instructional Paradigm on enhancement of dictionary skills in English at secondary level.

Methodology

The Experimental Method with the Single Group Pre-test Post-test Design was adopted. The study was conducted on a final sample of 40 students of standard IX from Mar Athanasius Memorial Higher Secondary School, Puthencruz.

The tools used for gathering data were

1. Manuals for teaching based on Integrated Instructional Paradigm (six dictionary skills were identified and each was elaborately dealt with)
2. Longman Dictionary of Contemporary English (a monolingual dictionary).
3. Test of Dictionary Skills in English (prepared on the basis of a Blue Print).

Simple Percentages, Arithmetic Mean, Standard Deviation, and 't' value were computed

Analysis and interpretation of data

The Pre- and Post-test scores obtained before and after experimentation were consolidated and statistically analyzed. The number and percentage of secondary school students having each of the six selected dictionary skills in English in the Pre- and Post-tests are presented in Table 1.

Table 1

No. and % of secondary school students having the selected dictionary skills in English in the Pre- and Post-tests (N=40)

Dictionary Skills		Identification of labels and abbreviations		Arrangement of words in alphabetical order		Formation of compound words (collocation)		Syllabification		British English and American English equivalents		Prefixes and Suffixes	
Tests		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Students having the dictionary skills	No	4	38	32	40	14	40	7	40	16	40	13	39
	%	10	95	80	100	35	100	17.5	100	40	100	32.5	97.5

The figures in Table 1, relating to the Pre-test, give a clear picture of how unfamiliar the students are with the six dictionary skills in English that were selected for study. The students were found wanting in almost all these skills. As per the Pre-test scores, dictionary skills like *identification of labels and abbreviations (10%)* and *syllabification (17.5%)* were the most unfamiliar, and skills like *prefixes and suffixes (32.5%)*, *formation of compound words/collocation (35%)* and *British English and American English equivalents (40%)* were found lacking in students, while most students have some awareness of the skill *arrangement of words in alphabetical order (80%)*.

These findings lead to the conclusion that dictionary skills in English are minimum among secondary school students and confirm the first hypothesis.

On the other hand, the results of the Post-test were quite encouraging; the students were able to attain substantial improvement in all equivalents (Pretest: 40% and Posttest: 100%) were **enhanced to a great** extent in secondary school students as a result of the experimental treatment; and

3. arrangement of words in alphabetical order (Pretest: 80% and Posttest: 100%) was also **effectively enhanced** in secondary school students as a result of the Integrated Instructional Paradigm.

The Arithmetic Means and Standard Deviations of the Pre- and Post-test scores of secondary school students in their dictionary skills in English and their t-value were calculated, the details of which are presented in Table 2.

The t-value obtained on comparing the Pre- and Post-test scores of secondary school students (t = 38.17) indicates that there is significant difference in their dictionary skills in English ($p < 0.01$). The Mean values

Table 2

Data and results of t-test with respect to Pre- and Post-test scores of secondary school students in dictionary skills in English (N=40)

Statistical data	Pre-test	Post-test	γ	SE_γ	't' value	Level of significance
Arithmetic Mean	13.81	21.13	0.53	0.02	38.17	0.01
Standard Deviation	0.25	1.13				

the six dictionary skills. It was found that the dictionary skills

1. *identification of labels and abbreviations* (Pretest: 10% and Posttest: 95%) and *syllabification* (Pretest: 17.5% and Posttest: 100%) were **very effectively enhanced** in secondary school students by using the Integrated Instructional Paradigm;
2. *prefixes and suffixes* (Pretest: 32.5% and Posttest: 97.5%), *formation of compound words/collocation* (Pretest: 35% and Posttest: 100%) and *British English and American English* equivalents (Pretest: 40% and Posttest: 100%) were **enhanced to a great** extent in secondary school students as a result of the experimental treatment; and
3. arrangement of words in alphabetical order (Pretest: 80% and Posttest: 100%) was also **effectively enhanced** in secondary school students as a result of the Integrated Instructional Paradigm.

The Arithmetic Means and Standard Deviations of the Pre- and Post-test scores of secondary school students in their dictionary skills in English and their t-value were calculated, the details of which are presented in Table 2.

The t-value obtained on comparing the Pre- and Post-test scores of secondary school students (t = 38.17) indicates that there is significant difference in their dictionary skills in English ($p < 0.01$). The Mean values obtained by the students in the two tests (Pretest A.M. = 13.81 and Posttest A.M. = 21.13) conclusively prove that students scored excellently after exposure to the Integrated Instructional Paradigm.

These results lead to the conclusion that the Integrated Instructional Paradigm is highly effective in enhancing dictionary skills in English among secondary school students and substantiates the second hypothesis.

Implications

The findings of this study prove that acquisition of dictionary skills among school

students is a totally neglected area and point to the urgent need to introduce and familiarize students with the various dictionary skills in English.

The Course books offer immense scope for reference. Textual and supplementary exercises in the Practice books can be worked out only with the help of a dictionary. Pronunciation, a long neglected area, is getting back its due place in English teaching and learning after a long time. Dictionary skills need to be developed in order to make good use of the aids to pronunciation provided in the glossary or appendix of the Course book.

The dictionary is now indispensable in the English classroom. The present skill-based syllabus demands that students develop reference skills to keep abreast with multifarious curricular activities, among which, dictionary skills are the most useful and handy tool for higher learning.

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Environmental Sustainability as a Vital Source for Sustainable Development

Dr. T.V. Thulasidharan

"The Stockholm Conference in 1972 stated: "To defend and improve the human environment for present and future generations has become an imperative goal for mankind, a goal to be pursued together with, and in harmony with, the established and fundamental goals of peace and of worldwide economic and social development." The Rio Earth Summit in 1992 carried forward the Programme and emphasized the need for sustainable development to ensure human life with dignity in harmony with the nature.

The basic tenet of sustainable development is the need to integrate social, environmental, and economic concerns so as to arrive at development paths, which meet the needs of present generations, without compromising the ability of future generations to meet their own needs. This is known as the doctrine of inter-generational equity.

At the Millennium Summit of World Leaders, (2000) 189 countries declared "their collective responsibility to uphold the principles of human dignity, equality and equity at the global level", and held out the promise to achieve: eradication of poverty and hunger; universal primary education; gender equality and empowerment of women; reduction of child mortality; improvement of maternal health; combating of HIV/AIDS, malaria and other critical diseases; environmental sustainability; and forging of global partnerships of development by 2015 AD.

In his address to the World Summit on Sustainable Development (WSSD 2002) Kofi Annan said: "But we also need to know better how and where to act – meaning that research and development are especially important, particularly studies that focus more on the diseases of the poor, which have historically been neglected. Water, energy, health, agriculture, and biodiversity – five areas that make up an ambitious but achievable agenda, five areas that can be remembered by a simple acronym: WEHAB. You might think of it like this: we inhabit the earth. And we must rehabilitate our one and only planet .... The issue is not environmental versus development, or ecology versus economy. Contrary to popular belief, we can integrate the two. Nor is the issue one of rich versus poor. Both have a clear interest in protecting the environment and promoting sustainable development. But the most creative agents of change may well be partnerships – among governments, private businesses, non-profit organizations, scholars, and concerned citizens. Together, we will have to find our way toward a greater sense of mutual responsibility."

Interface of Education with Sustainable Development

Education being a basic component of human development, its interface with sustainable development is well established. Education is perhaps the single most important means for empowerment and for a sustained

improvement in well-being. Improvements in educational attainments are accompanied by improvement in health and longevity of the population and the country's economic growth. Education reinforces the socio-economic dynamics of society towards equality and promotes a social order conducive to an egalitarian ethos. The principle of equality or non-discrimination is the foundation of international human rights law. Discrimination results from deep-rooted attitudes of population and it is for the governments to take the lead to induce the change in attitudes through education. In short, education is the best social investment. This is the significance of quality higher education.

In spite of the directive principle of state policy for free and compulsory education to every child up to the age of 14 years in article 45 (now a fundamental right in article 21A), nearly one-third of the population remains illiterate, most of whom are young. There remain critical gaps in the availability of infrastructural facilities and qualitative equipment and personnel in the education system. On the other hand, the national literacy percentage has increased from 18.3 in 1951 to 65.2 as per Census 2001. The regional imbalance is evident from the fact that literacy is nearly cent percent in Kerala, but only half or 50 percent in Bihar. The literacy rate for scheduled castes and scheduled tribes is much lower, and that for women even lower.

The twenty-first century is the century of knowledge. It is the task of the knowledge makers to evolve new technologies and to make them work for human development. New technologies backed by proper public policies will lead to healthier lives, greater social freedoms, increased knowledge and greater productivity. Distributive justice would become an achievable goal. Technology networks are expanding people's horizons and creating potential to achieve quicker progress.

Scientific or technological innovation has relevance and value to our people, if it provides effective, affordable and sustainable solutions to the problems of under development, poverty, illiteracy, hunger and safe drinking water. Amartya Sen describes them as the great 'unfreedoms' and his thesis on 'Development as Freedom' is based on that premise.

Sustainable development is a basic human right. Unless this target is reached with the potent tool of education, the purpose of higher education would remain unfulfilled. The link between the two must be forged into an inseparable bond to empower the people.

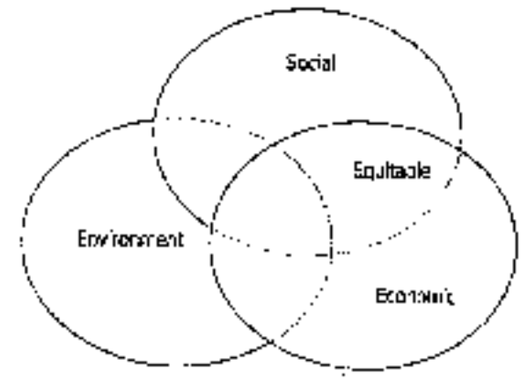
The 2001 UNDP Report aims at making new technologies work for human development. It contains a manifesto for forging a new partnership between technology and development referring to the Internet and biotechnology advances with new generation of pharmaceuticals. These are the challenges of the new millennium. The Report of the World Commission on Dams (WCD) recommends rights-based approach for development and mega projects instead of the earlier 'cost-benefit' approach. It also emphasizes that those affected by the development project must also share in the benefit derived therefrom. This is the requirement of sustainable development.

The sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable development does not focus solely on environmental issues. More broadly it encompass three general areas, economic, environmental and social.

The Universal Declaration on Cultural Diversity (UNESCO, 2001) elaborates further the concept by stating that "... cultural diversity is as necessary for human kind as biodiversity is for nature" it becomes "One of the roots of

development understand not simply in terms of economic growth, but also as a means to achieve a more satisfactory intellectual, emotional, moral and spiritual existence." In this vision, cultural diversity is the fourth policy area of sustainable development.



Interrelationship between social, economical and environmental factors for sustainable development

Sustainable development can also be explained as a process rather than an end goal. This process requires further analysis and knowledge of alternatives than does traditional development processes.

The interrelationship between social, economic and environmental factors for the sustainable development is depicted in the figure.

Wherever the interaction between the social, economic and environmental factors are bearable, equitable and viable, then only the sustainability is possible.

Education for sustainable development

Education is the first and foremost human right as proclaimed in Article 26 of Universal Declaration of Human Rights. It is also the key to building up the skills and capacities in all domains necessary for techno-economic development. Further it is the means whereby people may hope to address some of the most profound problems confronting our societies in the current centuries and the new millennium. Further, education helps to foster all forms of behaviour, life styles and values necessary for human survival on a crowded planet (Mayor, 1997).

Education is a prerequisite for development. It promotes awareness, sharpens the eye of knowledge and makes mind logical (Allen, 1998). Further it attacks poverty, increases economic growth, improves income distribution and reduces inequality. Literacy as the backbone of education (Seth, 1997) acts as the cause and effect of development. Literacy as a qualitative attribute of the population is one of the most important indictors of the socioeconomic and political development of society. It strengthens and sustains the process of development.

The achievement of environmental goals through education, awareness and training described in Principle 10 of Rio Declaration (1992) states- "Environmental issues are best handled with the participation of all concerned

citizens at the relevant level. At the national level, each individual shall have appropriate access... participation by making information widely available."

The lesson that rights and duties are correlative should form a part of education. Science without spirituality has a dehumanizing effect, which needs to be prevented by providing education also in the duties. Such was the belief of Swami Vivekanada, who said in the year 1893 at Chicago that: "With the development of science and technology, if the humanity is to survive, humanity has to get the benefit of science and technology, and there should be a synthesis of science and spirituality.

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Efficacy of Test-Taking Strategies in Mitigating Test Anxiety and Enhancing Achievement

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Our strongest childhood and adolescent memories probably include taking tests in school. Pupils have strong or mixed feelings towards tests. The major function of a class test is to measure student achievement and thus contribute to the evaluation of educational progress and attainment. Classroom tests also motivate and direct student learning. Students do tend to study harder when they expect an exam than when they do not.

Today's school education is much concerned about the learner. The learner is an important factor in the teaching-learning process. Learning is not only the acquisition of knowledge, but also the use of knowledge in critical and creative thinking and in problem solving situations. One of the most important responsibilities of a teacher is to evaluate student achievement. Evaluation is necessary for growth of both student and teacher. It is a continuous process, and forms an integral part of the total system of education. Teaching and testing are the 2 sides of a coin and should go simultaneously. Tests are one of the main ways to gather information on student learning. Test results can be used to review students, evaluate the quality of instruction and identify areas of difficulty.

Anxiety often accompanies students during exams. To some extent anxiety is helpful but too much of it is harmful and negatively affect student performance. When this happens, test scores can present a distorted view of student learning. The actual measurement of achievement requires active cooperation from students. If they lack skill in test-taking, their scores may fall short of their true achievement. Differences in strategy use between high and low achievers indicate that some strategies are beneficial to learning, retention and retrieval of information whereas other strategies are not beneficial and may lead to poor academic performances.

Preparing the students for the test goes hand in hand with preparing the test for the students. Students need to know how to give a good account of them on the test. Students who are richly endowed with test-wiseness (Skill in test taking) are to be able to score well on any test. It is supposed that objective type tests are better measure of student's test-wiseness than of their real achievement. Present school education system of Kerala State Government provided the facility of using 'cooling time' for school students while taking test, in which they can go through the question paper.

Providing test strategy instructions would help students alleviate their concerns, study materials effectively, and perform well on test, and thus increase their academic success. Hence this study is to find out the effect of test-taking strategies on test-anxiety and achievement in mathematics of students at secondary level.

Hypotheses of the study

The hypotheses formulated for the study are

1. The achievement in mathematics of students who were taught using lessons based on test taking strategies will be significantly higher than with those taught in present method of teaching
2. The test anxiety of students who were taught using lessons based on test taking strategies will be significantly lower than with those taught in present method of teaching

Objectives of the study

The major objectives of the study were

1. To compare the effectiveness of teaching based on test taking strategies on achievement in mathematics at secondary level with present method of teaching
2. To compare the test anxiety level of secondary school students who were taught using lessons based on test taking strategies with those taught in present method of teaching

Methodology of the study

Experimental method was selected for the present study. The design adopted was non-equivalent pretest-posttest design. The study was conducted on a sample of 90 students of standard VIII, 45 each in experimental and control groups. The experimental group was taught using lesson transcripts based on test taking strategies and the control group by present method of teaching. Pretest and posttest in mathematics and test anxiety were conducted for both the groups.

Teaching strategy based on test taking skills

In this study, 12 test taking strategies were taken and they were divided under three categories as follows

1. Strategies for Refreshing time
2. Strategies for Recovery time
3. Strategies for Review time

Refresh time is the time before starting to write the exam. Recovery time is time during which the child works with the problems in the test and review time is the time after completing the writing and working with problems.

The lesson plan consists of the following parts-

1. Presenting the test taking strategy for the particular topic in a puzzling way
2. Teaching the topic with the aim of attaining the particular test taking skill.
3. Exercising the test taking skills by using certain problems related to the topic.
4. Review, giving importance to test taking skills attained

The lesson plans were designed incorporating test taking strategies suited for the corresponding topics.

Analysis and interpretation of Data

The achievement test scores in mathematics and the test anxiety scores of the experimental and control groups were subjected to ANCOVA.

Conclusions based on findings of the study.

The above analysis leads to the following conclusions

1. Teaching based on test taking strategies enhance the level of achievement in mathematics of secondary school students than the present method of teaching.

This is supported by the following findings

- The result of ANOVA of the mathematics achievement test scores of the experimental and control groups showed that there was a significant difference in their posttest scores on y(F_x= 0.25;p>0.05& F_y= 12.31;p<0.01).
- The result of ANCOVA of the mathematics achievement test scores of the experimental and control groups showed that there was a significant difference between means of their posttest scores ($F_{y.x}$= 12.76;p<0.01).
- When the adjusted means of the posttest scores of the experimental and control groups were compared, experimental group showed a significant superiority ($M_{y.x}$-experimental-is 28.01, $M_{y.x}$-control-is 21.34, t= 3.56; p<0.01)

2. Instruction based on test taking strategies can effectively reduce the level of test anxiety of secondary school students than the present method of teaching

- The result of ANOVA of pre and posttest scores in test anxiety of experimental and control groups showed a significant difference only in their posttest (F_x= 0.02;p>0.05& F_y= 67.1;p<0.01).
- The result of ANCOVA of the test anxiety scores of the experimental and control groups showed that there was a significant difference between means of their posttest scores ($F_{y.x}$= 78.24; p<0.01).
- While comparing the adjusted posttest means of the two groups the difference between them was found significant. It is seen that the experimental group got remarkable performance in reducing the test anxiety after experiment.($M_{y.x}$ experimental-is 71.63, $M_{y.x}$-control-is 92.17, t= -8.85; p<0.01)

Educational Implications.

To teach without evaluating the extent of learning is foolish. Testing and teaching should not be regarded as mutually exclusive. They are intimately related parts of the total teaching effort. The cognitive ability and ability to demonstrate are equally important skills to be learned by the student. Anxiety during tests negatively affects student's performance. Hence the coaching of tackling tests should be given to the students. Training should be given to students to approach the test with a calm, cool and concentrated mind. Teaching and testing can become colourful through proper training.

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Adjustment Pattern and Achievement Motivation of the Hearing Impaired and Normal Students at Secondary Level

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Hearing impairment is the most serious disability condition. Children with hearing difficulty show some problems in adjustment in emotional, social and educational development, because the handicap in the development of their language creates a barrier for normal communication. The most significant aspect of these children is their increased dependence on others which lead to a sense of inferiority. Myklebust (1964) notes that people who become physically disabled, typically experience certain sequential stages (denial, hostility and depression) before achieving a measure of psychological adjustment as those of better physique, but their failures are apt to be more severe as well as more frequent. According to Cappel et al. (1995) adjustment problem may occur in the normal developmental process of any individual who is simultaneously striving for expansion and maintenance of the self concept already developed. But the findings of these studies may not always hold good in a culture that is widely different from that of theirs. The social and psychological impact of disability would be varied in different communities according to the diverge nature of their social conditions and attitudes.

In Kerala, government is taking initiative to improve the life situations of hearing impaired by implementing several policies and plans. The number of deaf schools is limited. In the special schools these children face many problems and their adjustment to the school is also poor. The funds allotted for the school are very low. The schools do not have enough facilities to provide appropriate academic and vocational training to the students. Now the society has realized the talents and potentials of the deaf people and has decided to extend their co-operation to increase their achievement motivation. In this context, it is hoped that this study will evoke attention of the authorities to plan preparatory education and counselling for hearing impaired students. Further the study intends to generate thoughts and ideas among teaching faculty in devising efficient and exhaustive methods for assessing achievement motivation and implementing more dynamic methods for the development of better social, emotional and educational adjustment of hearing impaired students who are in the threshold of adolescence.

Objectives of the Study

1. To study the adjustment pattern of hearing impaired and normal students at secondary level
   a. Emotional adjustment
   b. Social adjustment
   c. Educational adjustment
2. To study the achievement motivation of hearing impaired and normal students at secondary level.
3. To compare the adjustment pattern and achievement motivation of hearing impaired and normal students

Methodology

Tools used

1. Socio Demographic profile (Prepared by the investigator)
2. Adjustment Inventory for School Students (AISS) (Sinha and Singh, 1994)
3. Achievement Motivation Test (Bhargava, 1994)

Analysis and Discussion

1. The adjustment pattern of hearing impaired and normal students at secondary level.

Table 1

Mean and Standard Deviation of the Emotional, Social and Educational Adjustment of the Hearing Impaired and normal Students for the Total Sample

Category	Variables	No	Mean	SD	Category of adjustment
Hearing Impaired	Emotional adjustment	50	9.98	2.33	Unsatisfactory
	Social adjustment		7.52	1.50	Average
	Educational adjustment		8.95	2.28	Unsatisfactory
Normal	Emotional adjustment	50	5.72	1.91	Average
	Social adjustment		5.64	2.39	Average
	Educational adjustment		5.40	2.32	Average

It is seen that the emotional and educational adjustments of hearing impaired students are unsatisfactory. They have only average social adjustment. But, the emotional, social and educational adjustments of normal students fall in average category.

When the hearing impaired students realize that they could not perform like a non handicapped, in certain circumstances, they feel inferior and inadequate. The parental attitude of rejection, stress in family, community etc. may result in emotional maladjustment. They follow the same curriculum of normal students and there is no adequate special teacher for handling their educational needs. These factors may contribute for their unsatisfactory educational adjustment. The reason for their average social adjustment may be the developmental and socio cultural conditions experienced by them.

2. Achievement motivation of hearing impaired and normal students

Table reveals that 38% of hearing impairment students have very low achievement motivation, and only 6% have above average achievement motivation. It is interesting to note that none of them have high achievement motivation; Where as in the case of normal students, 20% have high achievement motivation; 4% have low level of achievement motivation. None have very low level of achievement motivation.

Table 2

Number and Percentage of Achievement Motivation Scores of Hearing Impaired and Normal Students

Category of Achievement Motivation	No		Percentage (%)	
	Hearing	Normal Impaired	Hearing Impaired	Normal
High	0	10	0	20
Above average	3	12	6	24
Average	6	22	12	44
Below average	8	4	16	8
Low	11	2	22	4
Very low	19	0	38	0
	50	50	100	100

This finding may be due to the fact that the hearing impaired students have less opportunity to attend and receive expert's classes and opinions about achievement motivation, future career etc. The normal students have more opportunity to get proper guidance and counselling

3. Comparison of the adjustment pattern and achievement motivation of hearing impaired and normal students

Normal students get more chances to interact with the external world and they set high goals in life which results in their high achievement motivation. But, in the case of hearing impaired they are unable to receive any information from the society. Also because of their language problem they can not communicate to the society. This results in their low achievement motivation.

Table 3

Data and Result of Test of significance of the Difference between Means of different Adjustment Pattern and Achievement MotivationScores of Hearing Impaired and Normal Students

Category	No	Variable	Mean	SD	CR	Level of Significance
Hearing Impaired	50	Emotional Adjustment	9.96	2.93	8.24	P < 0.01
Normal	50		5.72	2.81		
Hearing Impaired	50	Social Adjustment	7.52	1.50	4.21	P < 0.01
Normal	50		5.84	2.39		
Hearing Impaired	50	Educational Adjustment	8.96	3.20	6.13	P < 0.01
Normal	50		5.48	2.32		
Normal	50	Achievement motivation	21.74	0.58	7.15	P < 0.01
Hearing Impaired	50		11.56	5.28		

Compared to normal students, hearing impaired students are emotionally less stable. May be their frustrations are due to their limitations and inadequacies.

Hearing impaired students are socially less adjusted than normal students. The reason may be the socio-cultural conditions experienced by them. They cannot interact with the society properly because of their communication problem.

The hearing impaired students are educationally less adjusted than normal students. It is found that there is no adequate special teachers for handling their classes and satisfying their educational needs.

Likewise compared to normal students hearing impaired students have low achievement motivation.

Conclusions

The emotional and educational adjustment of hearing impaired students are unsatisfactory so they are only average in social adjustment,gender has a significant influence on the emotional and educational adjustment of hearing impaired students, but has no significant influence on their social adjustment. Locations of residence also play a significant role on the emotional, social and educational adjustment of hearing impaired students whereas, the emotional, social and educational adjustment of normal students is in the average category.The achievement motivation of hearing impaired students is even though low, it is influences by gender.

It is seen that boys have better achievement motivation than girls. Difference

in the location of residence is not a significant influencing factor in the achievement motivation of hearing impaired school students But The achievement motivation of normal students are in the average level. Compared to normal students, hearing impaired students have lower level of emotional, social and educational adjustment and achievement motivation.

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Development of Computer Assisted Model for Teaching Biology at Higher Secondary Level

Dr. Esther Gladiz

The present century is marked by the explosion of scientific knowledge which has resulted in several educational innovations. According to Bharatia[1] (1989), ***the aim of science teaching is not the acquisition of information and a few skills but to attain the understanding of the relationship which connects the answer to the problem.***

The scope of Educational Technology seeks to have a happy conglomeration of all the media, methods and materials used for better teaching and learning. It has rightly been printed out by Habbard (1974), ***Education Technology is the complement of curriculum reform concerned with the method where curriculum reform is concerned with content - given an acceptance of the concept of educational technology as the process of improving learning process.*** This leads us to think that the methods of learning i.e., learning how to learn, the habits of self study, independent thinking etc.

The use of computer, World Wide Web and Internet, e-mail, faking and electronic bulletin board, among others will guide pupils to attain vital objectives of instruction. Desktop videos, as a truly modern device in technology, integrate voice, sound, and the pictorial images. Educational technology provides the mechanism by which knowledge is passed from one to another very quickly. Modern society has become extremely dependent upon technology. Computers are used in all sectors in the society and it has been felt computer assisted instruction although is still in an experimental stage, seems to revolutionize the whole spectrum of education. It has better finishing and more versatility than any of the teaching machine.

Objectives of The Study

The objectives of the study are:

1. To prepare Computer Assisted Model lessons for teaching the topic 'Euglena' in Biology at Higher secondary level. (Plus 1)
2. To test the effectiveness of Computer Assisted model by inter group comparison of the achievement in Biology of the treatment groups – Computer Assisted Model (CAM) group, Self Learning Method (SLM) group and Lecture Method (LM) group for total sample:
   - (i) Pre-test Achievement
   - (ii) Immediate Post-test Achievement
   - (iii) Delayed Memory Achievement

Hypothesis

In the light of experimental procedure, the objectives stated are reformulated as experimental hypothesis. The hypothesis formulated in this connection is presented below:

H. When the Treatment groups: Computer Assisted Method (CAM), Self Learning Method (SLM) and Lecture Method (LM) groups are exposed to experimental teaching (based on total sample): There will be significant difference among the treatment groups (CAM, SLM, LM) with regard to:

(1) Pre-test achievement

(2) Immediate post-test achievement

(3) Delayed memory achievement

Methodology

The investigator adopted experimental cum survey method for the present investigation. The major purpose of the present study is to prepare and test the effectiveness of computer assisted Model for learning Biology at higher secondary level (Plus-1). The effectiveness of CAM was tested by comparing the achievement scores (pre, post, delayed and extent of forgetting scores) of treatment groups (Computer Assisted Model Group, Self Learning Group and Lecture Method Group). The study was conducted on a sample of 242 students at Higher Secondary Level.

Experimental Procedure

The experimental groups were exposed to computer assisted method and self learning method and control group to lecture method after administration of pre-test. After completing experimental teaching, achievement test was administered to the treatment groups, (CAM, SLM, and LM) to assess the terminal behaviour immediately. Achievement test was administered to the treatment groups after three months of immediate post test to collect delayed achievement scores. The same achievement test was used as pre-test, post-test and delayed memory achievement.

Findings

Comparison of mean scores (based on total sample) of computer assisted group **(CAM, Myx = 49.62, self learning group (SLM, Myx = 29.49) and lecture method Group (LM, Myx =20.131) on immediate post-test achievement using analysis of covariance revealed that computer assisted group is more effective than self learning group and lecture method group with regard to immediate post-test achievement.**

Comparison of mean scores (based on total sample) CAM (Myx = 59.27), SLM (Myx = 55.49) and LM (56.83) on delayed memory achievement scores revealed that computer assisted group is more effective than self learning and lecture method group with regard to delayed memory achievement. Since the adjusted scores of CAM is higher than of SLM and LM groups it can be concluded that computer assisted group is significantly superior to self learning group and lecture method group.

Comparison of Extent of Forgetting Scores of CAM, SLM and LM (inter group comparison of difference between the immediate post-test and delayed memory post-test achievement Scores), revealed that Fc (Fx=44.39) is more than F at 0.01 level (4.71). The adjusted mean scores for the self learning group is greater than that of CAM and LM groups.

The result obtained shows that CAM group has better achievement than SLM and LM groups. This indicates that CAM group has more retention than the SLM and LM groups.

Discussion

The study revealed that computer assisted model is more effective than self learning method and lecture method with regard to immediate post-test achievement, delayed memory achievement and retention Power. The above mentioned findings indicate the effectiveness of computer assisted model on immediate and long term academic attainment. It is evident from the analysis that computer

assisted instruction is effective in satisfying the academic needs of students by providing self pacing, self evaluation, immediate reinforcement and self correction. Hence CAM can be considered as one of the best methods to improve learning of Biology from the elementary level onwards, to overcome the difficulties encountered by students in a heterogeneous classroom and to equip them for higher learning.

The study also highlights the need for identifying the nature and extent of availability of resources, extent of practice of computer assisted instruction. The above mentioned areas will be useful for the curriculum planners and teaching community to prepare suitable curriculum including computer assisted materials for making education more interesting, effective and meaningful. Due emphasis on faculty improvement programmes for updating teachers in the area of computer assisted instruction should be given.

The study will be useful for curriculum planners and teachers to develop more effective learning strategies, rather than replicate in another form activities, which have already taken place in the ordinary teaching learning environment. It is presumed that observations made above would yield fruitful results in the hands of resourceful persons who have a positive bend for effect changes in the teaching and learning of Biology, which in turn, would go a long way in improving the acquisition of scientific knowledge, process skills and reflective thinking capabilities among students.

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Impact of Cognitive Learning Strategies on Peer Tutoring among Student Teachers

Dr. Sindhya V.

Abstract

This study highlights the importance of cognitive learning strategies on peer tutoring among student teachers, which was conducted on a sample of 150 student teachers selected from S.N. Training College, Nedumgandu. In the beginning, a thorough orientation on various methods of teaching was given to the teacher trainees. They were asked to list out the strategies that can be applied both in peer tutoring and in criticism lesson session. With the help of teacher educators the most suitable ones were selected and they were practiced through peer interaction and competent students were selected as tutors. Peer tutoring was practiced in small groups in their optional classes. They were also asked to apply the strategies in their classrooms during practice teaching. Different learning principles included here are; the significance of indirect and informal learning; the relationship between cognitive and social development; the importance of individualization and attuning the material to the learner's interests and learning style; the use of pacing, repetition, and reinforcement. After the peer tutoring, the perceptions of student teachers were collected using a questionnaire and the percentages of responses were calculated.

Introduction

Cognition refers to the mental activity including thinking, remembering, learning and using language. When we apply a cognitive approach to learning and teaching, we focus on the understanding of information and concepts. If we are able to understand the connections between concepts, break down information and rebuild with logical connections, then our retention of material and understanding will increase. Increasing competition in the workforce and everchanging jobmarkets demand students to be more prepared for higher learning with skills that evolve from cognitive theory. These skills, including study skills, social skills, problem solving, and organizational skills, should be taught and integrated across the curriculum.

Bruner theorized that learning is dependent on how information is structured, organized and conceptualized. He proposed a cognitive learning model that emphasized the acquisition, organization, understanding and transfer of knowledge — focusing on "how" to learn, rather than "what" to learn. He reported that stimulus input received is actively perceived and interpreted in an organized fashion, using expectations developed from prior experiences. This learning theory assumes that each person interprets external events as they are encountered and incorporates them into a unique classification scheme.

Various theories in education and training put much emphasis on learner centered instruction and training. Keeping this view, a lot of new learning strategies have been developed and being implemented in the teacher education curriculum, especially through the problem based learning.

Peer Tutoring

Peer teaching is the process by which a competent pupil, with minimal training and with a teacher's guidance, helps one or more students at the same grade level learn a skill or concept. This programme refocuses the teacher's role towards facilitator of the learning process. Peer learning context provides opportunities for learners to interact with each other in verbal and nonverbal ways. It also provides a learning area for the development of individual's cognitive abilities. During interaction, they exchange ideas, information, perspectives, attitudes and opinions. Patterns of reasoning, thinking strategies and problem-solving skills of their peers can be modeled. During such interaction, individuals internalize knowledge, meanings and skills from each other; they also collaboratively build new knowledge and meaning. Peers are said to mediate each other's learning.

Tutoring provides the application of practicum component of the restructured B.Ed course. Students are benefited through interaction with peers as well as with school students as the field requirement that gives them practical experience complementing what they are learning in class. It is advantageous as; first, they will learn the subject matter that is being tutored. Second, they will learn how to tutor. Third, they will learn how to listen and communicate effectively. Fourth, and perhaps most important, they will learn about learning.

In a series of studies of peer interaction and learning, Webb (1989) consistently found that giving detailed explanation to others in the group is a strong predictor of achievement, that is, the student who does the explaining is the one who benefits.

The review of many such studies reveal the positive impact of peer tutoring on individual competency development. It is in this context that a similar study is conducted among the student teachers of Sree Narayana Training College, Nedunganda by applying the cognitive learning strategies in peer tutoring and found its impact by analyzing their responses. The study was done with the following objectives.

Objectives

- To list out the cognitive learning strategies that can be applied in peer tutoring
- To acquaint the student teachers with the use of various strategies in tutoring
- To study their perception regarding the applicability of cognitive learning strategies.

Methodology

After selecting the relevant strategies prescribed by the restructured B.Ed curriculum of Kerala University, a thorough orientation in the various methods of teaching is given to the teacher trainees. They were asked to list out the strategies that can be applied in peer tutoring as well as during their criticism lesson session. With the help of teacher educator the most suitable ones were selected and they were practiced through peer interaction. The competent students were selected as tutors. Peer tutoring was practiced in small groups in their optional class. They were also insisted in applying the strategies in their classroom during the practice teaching.

Sample: Sample consists of 147 student teachers of Sree Narayana Training College, Nedunganda

To strengthen the tutee - tutor conversion and to build a sense of shared ownership of the tutoring process, tutees meet together with tutors to reflect on their joint tutoring experiences. Students are given the opportunity to share their feelings and thoughts about the tutoring process and expand their understanding of learning through teaching. Included here are different learning principles; the significance of indirect and informal learning; the relationship between cognitive and social development; the importance of individualization and attuning the material to the learner's interests and learning style; the use of pacing, repetition, and reinforcement.

After the peer tutoring, the perceptions of student teachers were collected using a questionnaire and the percentages of responses were calculated.

Analysis and Interpretation of responses

Analysis of the responses collected using percentages was done to find out the suitability of the cognitive strategies on peer tutoring. Both the tutors and the tutees were provided with the response sheets.

Discussion of Results

It is found that, majority of student teachers consider the learning strategies used for peer tutoring were effective in developing many cognitive skills such as analyzing, reasoning, thinking, communication, questioning etc. A majority of the sample (73%) could identify the effectiveness of each strategy through peer tutoring and 75% of the student teachers have identified areas in their subjects where these strategies can be effectively used. A good number of students (81%) has the opinion that peer tutoring provided learner interaction and 69% of the student teachers believe that it has an added advantage of learning through teaching over the traditional method of learning. 60% of student teachers said that they can apply these strategies and peer tutoring approach in future teaching.

As far as the specific strategies are concerned, 81% responded that Inquiry training strategies are found to be more applicable in their teaching as they develop the questioning skills. Only 37% responded positively to Piaget's strategies and 45% to the Inductive thinking strategies. This may be due to the less applicability of these strategies in specific area of their optional subject. About half of the respondents said that peer tutoring is beneficial to all students.

On the whole a few responded negatively (12%) to peer tutoring in general as well as to the use of cognitive strategies. This may be due to the fact that it requires much effort and enthusiasm from the part of learners and shows their reluctance to change the passive mode of learning.

Conclusions

The Cognitive approach to teaching is gaining momentum. Educators have realized that for students to be successful in the twenty first century they need to be lifelong learners. Helping them to develop the skills necessary to become lifelong learners requires a different approach to teaching and learning. The direct instruction method that was used almost exclusively in the earlier part of this century, though still effective for some skills, is giving way to a more cooperative approach. One that involves students working together towards common goals, teachers serving as 'experts', coaches, and facilitators, and sometimes just getting out of the way and letting students discover things for themselves. What is technology's role in this movement? It is supporting the choices that teachers make every step of the way by providing the environment, the content, the experiment, and the place for students to 'put it all together' to share with other students, parents, and the world.

In the new strategies, the tutoring process is viewed as developmental, where all tutors have had the experience of being tutees as part of their apprenticeship for becoming tutors. Tutees benefit from the tutor-centered programme in a number of ways: motivation to learn improves through participatory sharing with the tutors; well-trained tutors heighten the tutees' learning; and the value of being

tutored as preparation for tutoring in the future increases their self-esteem. In addition, students recognize their importance as an educational resource; they are not only receivers, but givers and helpers as well. In essence, receiving tutoring serves more than the goal of learning the lesson. Peer relationships contribute to social and cognitive development and socialization. Learning, friendship, and social growth are often positive outcomes.

For the success of any innovative programme, it is very essential to seek the support of the administrators as well as that of the school-based management team. (Riessman, 1991). The support of the teachers is essential too, particularly because of the shift in their role as facilitators and managers of the learning process. To do this, they need to be trained and encouraged to put the programme in place. They will have to develop a working relationship with their teaching partners. The Laboratory has found that establishment of teacher support groups that meet regularly is beneficial in breaking down teacher isolation and developing innovative partnerships.

So with the support of the teachers and peers, our future teachers could be able to face the challenges of the upcoming global educational scenario and equipping our younger generation to meet their needs in a collaborative environment, which, in no other way is possible than through education. Hence our teacher education sector should also equip to foresee the challenges.

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Information and Communication Technology Enabled Science Education

Dr. Babu Kochamkunnel

Abstract

In this era of quality management in educational systems, only teachers who develop electronic content suited for e-learning would become global teachers. Unlike in conventional classes, if the lessons are on compact disc in a computer system then any one can learn at any time from anywhere at their own speed and at their level of understanding. Learning of difficult and abstract concepts in science through Information and Communication Technology (ICT) is lively, enjoyable, meaningful and effective for any type of children. The paper tries to highlights the tremendous impact of ICT in science education.

Complete functions of heart, digestive system and other organs of human and animal beings can be easily illustrated with an animated sequence. Most of the experiments in physics can be simulated with the help of computer programmes. Similarly a chemistry lab can be set up without any chemicals. Latest innovations and discoveries in Medical and Engineering field can be obtained through ICT all over the world. Thus the use of ICT tools such as e-mail, computer, Internet, videoconference overcome the barriers of space and time and open new possibilities of learning all over the world. But ICT is not the panacea for all educational problems. ICT helps only to supplement a good teacher. Real learning is the product of learners, teachers and materials interacting optimally.

Introduction

Educational Technology in its latest emergence as e-learning, has rich potentialities and possibilities for accelerating the pace of human progress in general and for bringing about development in various aspects of education in particular. It would help in surpassing the limits of time, distance and capacity. ICT makes teaching-learning process effective and efficient in the sense that learning with the use of ICT becomes easy, meaningful, interesting, durable, economic and also cost effective.

Why a change in teaching-learning process?

In the conventional classrooms teachers would be known only to the students of that particular college / university. But if they develop electronic content suited for e-learning they would become global teachers.

In the classroom it is a structured system and the student has to be present at a particular place at a specified time. However, if the lesson is on a compact disc in a computer system, anyone can learn at any time from anywhere, at their own pace and at the level of understanding that is comfortable for them. Unless we bring in such system we will not be able to compete with foreign universities and will remain backward.

e-learning

The advent of electronic technologies such as computer based instruction, multimedia,

Internet, intranet, worldwide web has resulted in some significant changes in teaching and learning. The application of such 'electronic' technologies in learning is nothing but e-learning. It is the blending of traditional and ICT based forms of learning in order to provide an interactive environment in which learning can take place at any time in any place.

The heart of e-learning is the idea that it should involve interaction.

The following types of learning delivery could be regarded as e-learning.

- Accessing or downloading a course from the internet or working through it online.
- Accessing or downloading a course on a company intranet
- Communicating with the tutor via e mail
  Working through an interactive CD-ROM
- This e-learning is the combination of learning experience involving new mechanisms for communication. (Arasi, 2004).

Role of ICT in Education

It is a well accepted fact that a single teacher cannot provide the complete and up-to-date information in any subject. ICT can fill this gap as it provide access to different sources of information. Educational institutions are also in the midst of information waves. Instead of big school's or large universities, e-university or online learning systems are emerged. Accordingly, the duties and responsibilities of the teachers and learners are to be changed to adjust with the new society of the new environment.

In early 1995, the Department of Education and Employment (DfEE) Britain, set the criteria for making ICT an integral part of initial teacher training (ITT) course, stating that ICT is more than a teaching tool. Its potential for improving the quality and standards of pupils education is significant. Equally its potential is considerable for supporting teachers, both in their everyday classroom role, for example by reducing the time occupied by the administrative works associated with it, and in their continuing training and development (DfEE 1995). In e-learning we get webstreamed lecture with synchronized slides, where as in conventional classes we get paper based lectures.

Tremendous Impact in Science Education

Multimedia is becoming increasingly popular in the science classroom at any level. The power of a CD-ROM lies in its interactivity, the way in which its content can be navigated and explored in as much or as little details as the user desires. ICT can offer a versatile and stimulating environment supporting a range of learning styles and joyful experiences in learning science. Multimedia environment of ICT can increase interest, motivation and enhanced science learning (Babu, 2003).

A teacher is able to supplement a lecture presentation, with high quality slides, charts and film clips to illustrate abstract and complex ideas. For example, an elementary science teacher begins a lesson on 'Heart' by asking "How does our heart works?" Children raise their hands and offer suggestions. The teacher then turns to the computer / videodisc, which starts with a video segment, with an animated sequence of the two sides of the human heart. On one side of the animated heart, unoxygenerated blood is represented by green arrows as it flows towards lungs. On the other hand, oxygenated blood, represented by red arrows, is shown flowing to the arteries on its way throughout the body. The next segment shows a live beating heart. The third segment shows an animated diagram of the heart valves as they alternately open and close. The final segment of the video shows an actual human heart valve open and close (Vanhorn, 1991).

Can we think of this kind of illustrations in an ordinary classroom set up? Here the ICT teacher can stop his class at any time to illustrate ideas or clear up student misconceptions. The windows on science, Videoencyclopedias, the living desert, Primary set, etc., are famous educational CD-ROMS and Videodiscs. Now through Internet any topics in science can be downloaded which offer a colourful presentation of the real world into the classroom.

Most of the experiments in Physics can be simulated with the help of computer programmes. Experiments on electricity and magnetism can be done without using cells, connecting wires and magnets, but using a mouse. The discharge tube experiment can be done without any costly discharge tubes or evacuating machinery which generally many science laboratories do not have.

A Chemistry lab can be set up without any chemicals. Entire salt analysis can be simulated without using HCl and NH_4OH. We can show the thickness of the white fumes of NH_4Cl. The effect of increasing or decreasing the temperature or pressure to change the velocity of chemical reaction can also be shown. Similarly, the structure of molecules, the mechanism of reaction, nature of electron sharing etc can also be shown on the computer. Again concepts of integration and differentiation as well as geometrical figures will be dearer to them when they are illustrated in screen. No animals need to be killed for conducting experiments in Zoology Laboratory. Latest studies in medicine and engineering taking place elsewhere can be accessed at our convenient time by sitting in our own room. Thus through computer, learning science becomes lively, enjoyable, easy, effective and more meaningful.

Conclusion

The use of ICT tools such as e-mail, computer, internet, videoconference overcome barriers of space and time and opens new possibilities for learning. The real issue is how it will improve student achievement and attitude towards learning. There may be a place for that technoscenario of "stay home, log on and boot up" for a few very independent learners, but real learning is the product of learners, teachers and materials interacting optimally. A good teacher presence is inevitable in any type of learning. Joseph K. Zerbo wrote in his thought provoking book "Educate or Perish: (1990) the dilemma of the modern world..... there is no alternative but to educate and do so rapidly and properly.

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Since the mid-1990s, Teacher Education has undergone noticeable quantitative and qualitative reform. While the quantitative growth of Teacher Education has been phenomenal the demands for meeting the increasing qualitative needs have evolved slowly and invisibly, but continuously.

If it is accepted that no education system can rise above the quality of its teachers, then the quality provision of teacher education attains critical importance. The quality and calibre of teachers that serve the educational system of a country can serve as an index of development and progress for that country. Therefore the quality of the training and education a teacher receives becomes most important. Although learning and teaching activities are at the heart of any educational experience, indicators and measures of quality in teacher education specifically, and education more generally, tend to focus attention on organizational and administrative processes.

Unless quality assurance practices adopt a comprehensive approach to the educational process, assuring high quality standards is always going to be incomplete. This is the area where much work is yet to be done. So let us look at Quality as Value – as an intrinsic value with a definite path and as an instrumental value to work in partnership.

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Effects of Deficits in Scientific Skills on Achievement in Science of the Learning Disabled at the Primary School Level

Dr. Jaimon P. Jacob

Introduction

The optimum development of a nation depends upon the nature and kind of its human resources. All individuals, regardless of their assets and liabilities of personality and potentality, contribute towards national development. Exceptional children, too, cannot be excluded from this

The term 'learning disability' is used to describe a specific group of children, adolescents and adults who have problems in learning. These problems are generally in the areas of reading, writing, spelling and mathematics. Parents and teachers usually discover the problem when the child fails to cope with school work.

Our society has become quite complex. We now recognise the fact that success in school has become more and more important. For the school child success or failure in education frequently will determine his future career as well as his role in society. Therefore failure due to learning disability can represent a major catastrophe affecting both the child and his family. A person with a learning disability may experience a cycle of academic failure and lowered self-esteem. Having these handicaps or living with someone who has them can bring overwhelming frustration.

Unlike other disabilities such as paralysis or blindness, a learning disability (LD) is a hidden handicap. A learning disability doesn't disfigure or leave visible signs that would invite others to be understanding or offer support. LD is a disorder that affects people's ability to either interpret what they see and hear or to link information from different parts of the brain. These limitations can show up in many ways as specific difficulties with spoken and written language, coordination, self-control, or attention. Such difficulties extend to schoolwork and can impede learning to read or write, or to do mathematical problems.

Need and Significance of the Study

The learning disabled feel difficult to cope up with the normal children. The educational programme for the learning disabled should be in accordance with their level of capability. When one finds difficulty in an area, it demands more effort to ensure proper balance. There is always a wide gap between one's own potential and the level of achievement expressed through performance. In learning disabled students the gap in the Scientific Skills is wider than the normal students, due to their deformities. This study aims at the deficits (gaps) in the scientific skills. These deficits in the Scientific Skills will affect the level of achievement.

Achievement in science is not uniform in the student body. Different sections of students categorised on the basis of limiting conditions of area, region and caste may exhibit differential pattern of achievement. This situation can also exist with reference to Scientific Skills. The present study is concerned with

assessment about the attainment of Scientific Skills by learning disabled among primary school students.

The recent trend is to reconceptualise the achievement in science in terms of higher level cognitive entities, contrary to the traditional mode of assessing achievement in terms of lower level cognitive entities. The scientific skills belong to the category of higher level cognitive entities. Modern science educators recognise it as one of the most dominant objective of teaching science in schools. Scientific skills are particularly relevant in science because of the very nature of science itself. It derives special emphasis in science education due to the fact that science is made up of a series of processes. Hence the desired outcome in science teaching should include, among other things, a mastery of important processes that are used in generating new knowledge in science.

However, studies on achievement in science have shown that mastery of information and mastery of scientific skils are both inadequate. Attempts are now being made to improve the learning process and achievement in science. It is important that the improvement in achievement is only through the mastery of scientific skils. The inadequacy in scientific skills surely reflect in science achievement.

Educationists have already conducted experiments to measure the nature and extent of relationship of scientific skills to achievement in science among normal students. But in the area of learning disabilities the studies are few. This study, therefore, aims at gaining information on the strength and weaknesses of the different categories of learning disabled students with reference to attainment of scientific skills and the nature and extent of the relationship of scientific skil's to achievement in science.

Hypotheses of the Study

The following are the hypotheses formulated for the present study:

(1) Nearly 1/5 of the total population are learning disabled at the primary level.

(2) There is significant variation in the science process skills among the normal and learning disabled as well as language learning disabled and mathematical learning disabled.

(3) Learning disabled students will exhibit certain gaps in science process skills which will affect their achievement in science.

(4) There is significant variation in the levels of achievement in science of normal and learning disabled students.

(5) There is significant variation in the levels of intelligence of normal and learning disabled students.

(6) There is significant difference between boys and girls of normal and learning disabled children with respect to their science process skills, achievement in science and intelligence.

Objectives of the Study

The following are the specific objectives of the study:

(1) To find the learning disabled (total) as well as language learning disabled and mathematical learning disabled at the primary school level.

(2) To find the difference between the normal and learning disabled children as well as language learning disabled and mathematical learning disabled with respect to their Science Process Skills.

(3) To find the effect of the deficit in Science Process Skills on achievement in science of the normal and learning disabled children as well as language learning disabled and mathematical learning disabled.

(4) To find the difference between normal and learning disabled children as well as language learning disabled and mathematical learning disabled with respect to their achievement in science.

(5) To find the difference between normal and learning disabled children as well as language learning disabled and mathematical learning disabled with respect to their intelligence.

(6) To find the difference between boys and girls of the normal and learning disabled with respect to their science process skills, achievement in science and intelligence.

Methodology in Brief

Normative survey method was adopted for the study. Sample for the study constituted 614 primary school children selected from Alappuzha and Kottayam districts in Kerala (Boys – 325, Girls – 289). The tools used for the study were:

1. Science Process Skill Test to assess the science process skills of standard IV children.
2. Test of Achievement in Science
3. Diagnostic Test to identify the disorders of Reading (Dyslexia) and Writing (Dysgraphia)
4. Diagnostic Test to Identify Mathematical Disabilities (Dyscalculia)
5. Raven's Coloured Progressive Matrices Sets A_s, A_{sl}, B.

Statistical Techniques Used

1. Test of significance of difference between means (Critical Ratio)
2. Pearson's product moment coefficient of correlation (r).

Identification of Learning Disabled (LD) and Non-Disabled (ND) Children (Total Sample)

It was found that 40 (6.50%) are language learning disabled and 77 (12.50%) are mathematics learning disabled. Thus the learning disabled (total) in the whole sample is 117 (19%) out of the total sample of 614.

Majority Findings of the Study

Analysis of data revealed that from among the sample of 614 standard IV children, 40 (6.50%) are language learning disabled and 77 (12.50%) are mathematics learning disabled. Thus, the total learning disabled in the sample is 117 (19%). This means that nearly 1/5 of the total population are learning disabled at the primary level.

Comparison of learning disabled (LD) and non-disabled (ND) students shows that there is significant difference in the science process skills between the two groups (CR = 33.13; $p < 0.01$). The higher mean value of ND children (M_1 = 9.30, M_2 = 34.22) shows that ND children are far superior to LD children in the case of science process skills. Comparison of language learning disabled and non-disabled also shows that there is significant difference in the science process skills of these groups (CR = 5.32; $p < 0.01$). Here also, the higher mean value of language LD children (M_1 = 19.52; M_2 = 30.83) shows that they are superior in science process skills compared to language LD children. Comparison of mathematics LD and ND reveals significant difference between them (CR = 5.95; $p < 0.01$). Higher mean value for mathematics ND (M_1 = 20.29; M_2 = 30.10) indicates that mathematics ND children are better in science process skills compared to LD children. It can be seen from the above findings that learning disabled children show significant deficit in science process skills.

Correlation coefficients obtained between science process skills and achievement in

science shows that a high correlation exists between these variables for both the groups. This means that as the science process skills increases, achievement in science also increases and vice versa. For the LD the correlation is 0.626; ($p < 0.01$) and for the ND $r = 0.734$; ($p < 0.01$). At the same time, comparison of LD and ND children shows that there is significant difference in the science process skills of both the groups. (CR = 30.13; $p < 0.01$; $M_1 = 9.80$; $M_2 = 34.22$). The higher mean value of ND children shows that ND children are far superior to LD children in the case of science process skills. The comparison of LD and ND children with respect to achievement in science also shows significant difference (CR = 54.07; $p < 0.01$; $M_1 = 7.93$; $M_2 = 30.65$). Here also, the higher mean value of ND children shows that they are well advanced in achievement in science compared to LD children. For the language learning disabled, the correlation between science process skills and achievement is highly significant ($r = 0.675$; $p < 0.01$). For language ND also it is highly significant ($r = 0.574$; $p < 0.01$). Here also, the comparison of language LD and ND shows that there is significant difference between these groups in their science process skills (CR = 5.32; $p < 0.01$; $M_1 = 18.52$; $M_2 = 30.83$) and achievement in science

(CR = 5.24; $p < 0.01$; $M_1 = 16.74$; $M_2 = 27.33$). The higher mean value of language ND shows that they are better than language LD children in science process skills and achievement. For mathematics LD ($r = 0.675$; $p < 0.01$) and ND ($r = 0.610$; $p < 0.01$) the correlation between science process skills and achievement in science is significant. Comparison of mathematics LD and ND children shows that there is significant difference between these groups in their science process skills (CR 5.95; $M_1 = 20.29$; $M_2 = 30.10$) and achievement in science (CR = 5.41; $p < 0.01$; $M_1 = 18.55$, $M_2 = 26.65$) indicating that mathematics ND children are superior to mathematics LD in their science process skills and achievement in science. This clearly indicates that learning disabled children exhibit certain gaps in science process skills which hinder their achievement in science.

Comparison of LD and ND with respect to their intelligence shows that there is significant difference between these groups in the case of their intelligence (CR = 26.09; $p < 0.01$; $M_1 = 42.27$; $M_2 = 67.73$). The higher mean value of ND children is indicative of the fact that ND children are more intelligent compared to LD children.

Comparison of LD boys and LD girls with respect to their science process skills shows that there is significant difference between them in their science process skills (CR = 2.19; $p < 0.05$). The higher mean value of LD boys ($M_1 = 11.03$; $M_2 = 8.17$) shows that LD boys are better in their science process skills. Comparison of LD boys and LD girls with respect to their intelligence (CR = 1.59; $p > 0.05$) and achievement in science (CR = 0.00; $p > 0.05$) reveals that there is no significant difference between these groups. Comparison of ND boys and ND girls shows that there is no significant difference in their science process skills (CR = 1.89; $p > 0.05$). But in the case of intelligence (CR = 1.59; $p < 0.05$; $M_1 = 16.44$; $M_2 = 17.04$) and achievement in science (CR = 2.09, $p < 0.05$;

($M_1 = 30.04$; $M_2 = 31.32$) significant difference was found between boys and girls and the mean value indicates superiority of girls over boys.

Suggestions

The findings of the present study have wide implications in the early identification of learning disability in children and in implementing

remedial measures in the teaching of learning disabled children. The diagnostic tests in reading, writing and mathematics for standard IV, constructed and standardised by the investigator by consulting experts in the field of education of the learning disabled children, experts from SCERT and teachers of primary school, will be of great use in identifying the learning disabilities of children in the area of reading, writing and mathematics learning disability at an early stage.

As the study found that learning disabled children have certain deficits in their science process skills, these should be remedied through proper and timely intervention. For that purpose, identification of learning disability at an early stage is inevitable. Learning disabled children need the support of a multidisciplinary team. It should consist of regular teachers, specialists, psychologists, speech therapists, physicians and counsellors. As learning disability can be misinterpreted as carelessness and inattentiveness, diagnostic tests like the one the investigator has constructed could be administered and based on the assessment through these tests, the child could be diagnosed in which area he/she is having the disability (reading, writing or mathematics) and can be remedied accordingly.

Policy makers, educationists and school authorities must ensure the support of professionals to identify the learning disability of the child and in giving adequate remedial measures. Teachers should provide the learning disabled child with extra time if he/she is unable to keep pace with the rest of the class. If required, the learning disabled child should be permitted to seek help from another child in copying notes and such activities which he/she find difficult. Parents also have a great role in the remediation of the learning disability of the child. Techniques like resource room model, special day school programme, appointment of an expert teacher, etc. should be practised to bring LD children into the mainstream without much difficulty, by simplifying the content with the support of songs and role-plays so as to enable the learning disabled child to get more interested in the curriculum.

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Emotional Intelligence of Teacher Educators: A micro Level Study

Dr. K. S. Anitha

Introduction

Emotional Intelligence is not a new conception in psychology. Many early psychologists began their study of intelligence by directing their attention to cognitive aspects. For long, the world gave much importance to Intelligence Quotient, psychologists devised tests to measure intelligence and these tests primarily measured intellect or rational intelligence which is useful to solve logical problems. However, other early researchers recognized that non-cognitive elements also were significant. Daniel Goleman revealed the importance of Emotional Quotient (EQ), which makes us aware of our feelings and that of others. Goleman argued that EQ is a basic requirement for the use of IQ. If the areas of our brain that feel are damaged, our ability to think effectively is diminished. This study analyzes the emotional intelligence skills and potential problem areas of teacher educators so that it would be a source of self-reflection. In addition, teachers could utilize emotional intelligence as a means of gaining a more complete picture of individual students.

Emotional Intelligence

Buck (1985) has defined emotions as the process by which motivational potential is realized or 'read out', when activated by challenging stimuli. Emotions can be interpreted as a 'read out' mechanism that gives information about motivational systems. Emotions communicate basic feelings and states from one individual to another. They signal urgent messages such as "let us get together" or "I am hurting" or "I am going to hurt you". Emotional Intelligence is the innate potential to feel, communicate, recognize, remember, learn from, manage and understand emotions. It is the ability to feel good about doing whatever you are told, ordered, forced, convinced, or expected to do.

Goleman's ideas of emotional intelligence include Howard Gardner's interpersonal and intrapersonal intelligences. The additional abilities are divided into five domains, which Goleman termed:

- Knowing one's Emotions: "...the self-awareness stage where one is able to recognize a feeling as it happens."
- Managing emotions. "...the ability to handle feelings in an appropriate manner". Managing emotion also involves recognizing the significance of a feeling and discovering methods of dealing with fears, anxieties, anger, and sadness.
- Motivating Oneself: "...the extent to which an individual acts upon a given idea, thought, or goal." Motivating oneself involves channeling emotions to achieve a goal, emotional self-control, and delaying indulgent and overpowering impulses.

- Recognizing Emotions in others "...moulds one's social skills, enhances one's empathic perspective, and increases one's social competence." Empathy involves sensitivity to others' feelings and concerns and the ability to take their perspective. This domain also involves appreciating people's differences.
- Handling Relationships: "The degree to which an individual forms and maintains relationships, reflects one's level of self-awareness and social competence." Handling relationships encompasses managing emotions in others, social competence, and social skills.

intelligence: 1) Emotional Perception: "...refers to the ability to accurately recognize emotions in oneself and in others. It also refers to the ability to discriminate between honest and dishonest expressions of emotion." 2) Emotional Regulation: "...refers to the ability to monitor and alter the intensity and direction of an emotion in oneself and others. It includes the ability to moderate negative emotions to remove the detrimental effects on adaptation as well as maintaining positive emotions that have hedonistic value." 3) Emotional Knowledge: "...refers to an understanding of emotions and the utilization of such information. It includes using emotions to direct attention to important aspects of the

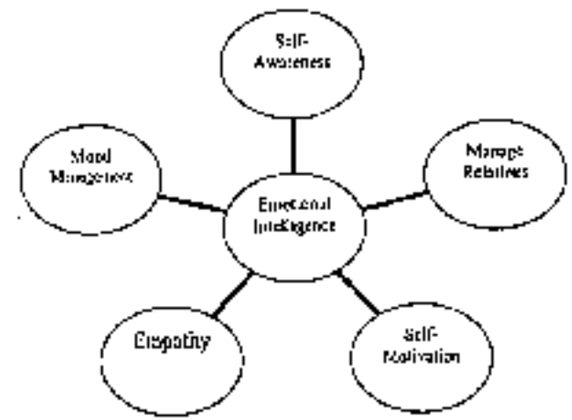

Figure - Emotional Intelligence and its dimensions

In the early 1990's, Mayer and Salovey first introduced the term "emotional intelligence." They defined it as "a type of social intelligence that involves the ability to monitor one's own and others's emotions, to discriminate among them, and to use this information to guide one's thinking and actions" (Richburg & Fletcher, 2002). They also designed a conceptual model detailing three chief components of emotional

social world, to develop creative and flexible perspectives, and to maintain motivation toward goals" (Fellitteri, 2002).

A thorough analysis revealed that emotional dimension of intelligence serve as an effective tool for teachers' personal and professional development. An educator must have dedication to lifelong learning and a commitment to personal and professional growth. One of the

critical aspects involved in the development of a healthy, personally accountable, and successful person is emotional intelligence. Thus, a teacher can utilize the investigation, comprehension, and improvement of emotional skills as a means of accomplishing various career goals. This study explored self-awareness, empathy, self-motivation, emotional stability, managing relations, integrity, self-development, value orientation, & commitment of teacher educators in Kerala.

Significance of the Study

Barke, Greenglass and Schwarger (1996) have reported the antecedents and consequences of teachers' psychological "burnout" and have inferred that changes are necessary to reduce work stress, improve supervisor support, increase social integration, and diminish the prevalence of job-related self. Exploring, understanding, and applying emotional intelligence skills can be utilized to facilitate these transformations. Educators who promote emotional intelligence skills emphasize the value of positive individual differences, promote the learning of teamwork and problem solving skills, and empower children to gain positive social skills. Such social skills boost students' relations, mutual respect, and engagement in classroom learning (Oblakor, 2001). Therefore, it is essential and beneficial for teachers to learn about their personal emotional intelligence skills, as well as those of their students. Hence the significance of the study

Objectives of the Study.

1. To find out the extent of emotional intelligence of teacher educators totally and based on different dimensions.
2. To compare the emotional intelligence of teacher educators with reference to gender and teaching experience.

Methodology

Normative survey method was adopted for the conduct of the study. Emotional intelligence scale developed by Hyde Dethe and Diler (2002) was used for the collection of data. It is a 5 point scale ranging from very high emotional intelligence to very low emotional intelligence. There were 54 statements in the scale so as to assess the different factors of emotional intelligence such as self awareness, empathy, self motivation, emotional stability, managing relations, integrity, self development, value orientation and commitment. The scale was administered on a sample of 120 teacher educators working in various colleges of teacher education in university of Kerala. Data relating to age and experience of teacher educators were also collected by the investigator. The reliability coefficient of the scale is calculated by split-half method and it is 0.88. In order to find out validity from the coefficient of reliability (Garette 1951), the

Table 1

Extent of total and dimension-wise emotional intelligence of teacher educators

Different Dimensions of EI	N	Mean	S.D
Self awareness	120	17.28	1.95
Self motivation	120	20.98	2.00
Mood management	120	15.98	1.91
Empathy	120	19.70	2.65
Managing relations	120	15.53	2.67
Total	120	89.3	8.56

reliability index was calculated which indicated high validity in account of being .93. Data thus collected was analysed using mean, SD, t value etc.

Discussion of Results

With reference to the objectives of the study the relevant data was collected and interpreted using mean standard deviation, and 't' values

As per table 1 the mean of total emotional intelligence is 89.3 and SD 8.56. Since the maximum score being 115, the measure of 89.3 tells that teachers have a clear perception of their emotional intelligence. The above

Table 2

Data and results of test of significance for the difference between means of emotional intelligence of teacher educators based on gender and experience

Gender	Number	Mean	SD	't' value	Level of Significance
Male	21	140	13.02	1.67	Not significant
Female	99	142	12.3		
Teaching experience	**Number**	**Mean**	**SD**	**'t' value**	**Level of Significance**
Above 10 years	27	143	5.32	1.42	Not significant
5 – 10 years	30	145	13.02		
5 – 10 years	30	145	13.02	2.04	Not significant
Below 5 years	63	136	12.99		
Below 5 years	63	139	12.98	1.54	Not significant
Above 10 years	27	143	5.82		

average level of mean are obtained for all the dimension-wise emotional intelligence also. The mean score is high for self motivation (20.98) whereas it is low in the case of managing relations (15.53).

It is seen that the 't' value obtained (1.67) based on gender is not significant even at .05 level. Therefore it can be interpreted that gender is not a determining fact for the emotional intelligence of teacher educators.

It is also seen that the teacher educators do not differ in their emotional intelligence based on their teaching experience since all the three 't' values obtained are not significant even at .05 level.

Conclusion

The findings of the study indicated that majority of teacher educators are able to recognize a feeling as it happens and to manage as well as motivate one self so as to handle interpersonal relationships in an empathetic way. Emotional intelligence is nothing but self-management of emotions and also recognizing emotions of others in a positive way. As far as the five emotional dimensions are concerned, teacher educators reveal an average level of performance, which prove that many are aware of the importance of each emotional skill and are able to exercise them wherever required. Moreover a person's emotional intelligence is often the most important factor in determining the success or failure in his career. Parents and teachers who help youngsters develop their EI make a wonderful contribution to the future success of the youngsters. Emotional competencies are not innate talents, but rather learned capabilities that must be worked on and developed to achieve

outstanding performance. So it is recommended that emotional intelligence should become an inevitable component in every phase of teaching- learning process for a healthy personal development.

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Heading Towards 2020: Key Strategies for Teacher Educators to Cope with Technological Advancements

Dr. Geetha Janet Vitus

Abstract

Actions made in the light of an adequate understanding of the technological revolution can help teacher educators to make use of that and head towards an informed society catering to the needs of the growing world. This article presents certain dreams that have to be realised in the field of teacher education in the coming years and some strategies that can be used for achieving it.

Education is struggling to come in terms with the pedagogic implications of preparing young people and adults for the demands of a rapidly changing knowledge economy. So there is an urgent need for a renewal in the whole system of education in our country. Do you think that our Teacher Education system has raised itself up to that standard to meet the present day demands?

For this an enhancement of the overall effectiveness of schools, with proper stress on the differing and sometimes conflicting personal perspectives on situations and human individuality is obligatory.

Dreams

❖ **Driving up standards: reform by imposition.**

Our Education was established to meet the needs of advanced societies for a literate population. The range and level of such aims has changed as new technologies have transformed society. More recently communication skills, IT skills, understanding of scientific environmental and technological issues and education for citizenship have all claimed a place in the agenda of necessity. With such expansion has come a shift from a primacy of emphasis on well defined workforce needs to a more complex vision in which the rhetoric's of workforce, flexibility, life long learning, democracy and citizenship all have been stressed in.

❖ **The ICT (Information and Communication Technology) Dream.**

With this picture in mind let us look at the use of ICT in schools. It reflects a number of influences. Not least among these is what some see as the need for systemic change in education, reflecting wider changes associated with what has been called 'the Information society'. The Government has demonstrated its belief in the need for education to change in the direction of higher levels of ICT use, and its impatience that such change was not happening sufficiently quickly, by requiring levels of ICT capability and pedagogical understanding amongst teachers.

ICT has been much heralded as holding great potential value for the improvement of teaching and learning. However, a fallacy often arises when technology is discussed, being that things (and almost invariably beneficial things) are claimed to happen because of the technology. The role of human agency is unconsciously overlooked or deliberately

omitted. ICT is more than just another teaching tool. Its potential for improving the quality and standards of pupils' education is significant. A more relational view would see the technology as shaping human activity, but also being in turn itself shaped through human activity.

The extension of the use of ICT in schools has not gone smoothly. Watson (1997) notes an apparent 'dichotomy of purpose' between a pedagogic, subject-focused rationale on the one hand ("using computers will improve teaching and learning in your subject"), and a vocational, technocentric rationale on the other ("the country needs young people who are technologically literate for the work force of the future"). The dichotomy has provided confusing messages to teachers about why they should use computers in their work.

These confusing messages could well have been exacerbated by other ambivalent feelings about the new technologies. For instance, as Goodson et al.(2000) point out, the messages associating the use of ICTs with improved learning outcomes may be seen as implied (or even direct) criticisms of teachers and may in some cases conflict deeply with teacher *identities and their personal educational concepts, ideals and projects.*

For achieving the ICT dream there are so many challenges before the learners and educators and so the following targets have to be set:

- connect all schools, colleges, universities and libraries as possible through a network
- ensure that serving teachers feel confident and are competent to teach using ICT in the curriculum; and that librarians receive similar training
- enable school leavers to have a good understanding of ICT, with measures in place for assessing their competence in it
- ensure that most administrative communications between education bodies and the Government and its agencies cease to be paper-based.

❖ Building a 'learning community'

This dream had grown as a result of the quest for new knowledge by teacher educators and the teachers over a period of time. Networked learning communities consist of schools whose motto can be *learning from each other...learning with each other*. They exhibit a range of defined features:

- A willingness to create space for staff to innovate;
- A high level communication, shared language, joint solutions and collaboration;
- A willingness to engage with and learn from theory and research;
- An openness to alternative ways of doing things;

Good networks exist in the knowledge-creating and teacher-learning business. They are motivated and bound together by the desire to improve our schools and the young people who travel through them. This lay opportunities for exploring creative and quality interaction between teachers, student teachers, teacher educators and learners, set within an ethos of learning at all levels. Moreover, working towards our vision of re-constructing learning, is firmly rooted in an exploration of how an interactive training tool might be embedded into the joint praxis of teacher educators and their student teachers in a training college. An internet networking will facilitate a wide range of collaborative activities which can be carefully documented and evaluated. These include:

- non-intrusive lesson observations in real time of both 'expert' and 'novice' teachers in their classes by large groups of student teachers;
- individual remote support by teachers and observations of lessons taught by student teachers during their practice in teaching in schools.
- sharing interactive whiteboard applications between the two sites e.g., student teachers creating and using digital teaching materials (especially using power point, web-quests and internet sites) with remote classes;
- student teachers experimenting with and carrying out micro-teaching activities for school students based at the remote site;
- interactions between learners, teachers and student teachers to discuss lessons and issues;
- teachers at one site participating in mentor training taking place at the other site;
- virtual meetings between teachers, student-teachers and technicians;
- using edited video recorded lessons to create on-line training materials for student teachers;
- observation of lessons conducted in a foreign language that was not necessarily the observer's first foreign language. This allowed student teachers to update their skills – especially in terms of classroom language and giving instructions – in their third language in preparation for their practicum;
- teacher-student teacher experimentation with interactive whiteboard use in order to enhance learners' literacy awareness;
- observation and analysis of the use of digital teaching as a communication as well as a pedagogic tool by a team of researchers.

❖ Redefined Teacher professionalism

When teachers talk about their work, their concerns are predictable. They talk about the fact that there doesn't seem to be enough time to cover what is expected, let alone time to follow up interesting lines of thought or explore new ideas with their classes. They feel that their freedom to make decisions about their work has been constricted. They worry about dealing with increasingly difficult behaviour from pupils. They are concerned about the image of teachers and an apparently generalised lack of respect for their work. They talk about the amount of testing and number of examinations they have to prepare pupils for. They talk about rising levels of stress, reduced leisure time and, often, express a sense that much of the enjoyment has gone from their work.

There is widespread agreement amongst educational commentators about current trends in teachers' work in developed countries (for example Apple, 1982; Goodson and Hargreaves, 1996; Smyth et al., 2000; Troman, 2000). These trends include:

- teachers' diminishing power to determine the curriculum they teach and how they teach it;
- a new emphasis on teachers' managerial and administrative role with pupils and with other adults working in school;
- changing pay structures, and a dismantling of union-won agreements;
- changing conditions of service.

Research reports and the professional literature about teachers' work from a range of different countries testify the fact that these same trends are observable across developed societies. If we take an even broader frame of reference, it is clear that, in developed societies, the nature of work itself is changing in response to what might be generally termed the processes of globalization – that is, the availability of information technologies and instant communication networks which facilitate the movement of capital around the

world to take advantage of local conditions. But in school, the changes mean that teachers' work has been redesigned, and that the skills teachers need today are different from the skills teachers needed in the past. Teachers' work is undergoing a process of radical change.

To be effective, schools rely upon the energy, confidence and commitment of individual teachers. Teaching should be optimistic, active work; teachers should consider themselves as 'deliberate promoters of particular ends' rather than neutral channels for providing a range of options. When teachers feel discouraged and disempowered as a group, the problem often becomes individualized and reframed to make individual teachers feel personally guilty or incompetent. The 'solutions' that follow are then also framed in individual terms – rectifying skills, deficits, appraisal, putting more accountability measures in place. I am interested here in looking at teachers' work from the other angle – understanding more about the broader context of teaching as work, exploring what societies seems to be demanding of teachers at this particular historical moment in the belief that teachers can regain some sense of power.

The pre-packaged curriculum materials used increasingly in schools both control and deskil teachers by divorcing conception from execution, and by contributing to a reduction in teachers' capacities to devise curriculum materials suited to the local contexts and needs of learners (Apple, 1982). Another way of looking at this issue is to see the current changes to teachers' work as part of an agenda to re-skil, rather than deskill teachers – though it is acknowledged that deskilling might be an unintended outcome of the re-skilling process (Smyth et al., 2000). It can be argued that teachers are being ideologically deskilled, in that they lose a degree of personal engagement with determining the goals and purposes of their work. This diminishing sense of autonomy at work is closely related to questions of professionalism.

All these aspects of teachers' work have a bearing on the issue of professionalism, a notoriously slippery concept, which can be used to argue both conservative and progressive positions in relation to teachers' work. As Lawn (1996), points out professionalism is 'a double-edged sword': it can be used both to control teachers and to 'protect the space and the labour process in the arena of policy and politics.'

Teacher professionalism should be redefined as a form of competent, multi-skilled, flexible labour practices operating within a regulated curriculum and internal assessment system. This movement from modernity - with its emphasis on mass production, expansion, central decision making – to postmodernity – with its emphasis on flexibility, responsiveness, decentralised decision making and compression of time and space – is 'more of a struggle than a transition' (Gee et al., (1996).

STRATEGIES

Strengthening the Presence of Technology in Formal and Informal Education

- Central and state agencies that help to set education policy should encourage the integration of technology content into Primary-+2 standards, curricula, instructional materials, and student assessments in non technology subject areas.
- The states should better align their Primary-+2 standards, curriculum frameworks, and student assessment in the sciences, mathematics, history, social studies, civics, the arts, and language arts with national educational standards that stress the connections between these subjects and technology.

- State Council of Educational Research and Training funded instructional materials and informal-education initiatives, should also stress these connections.
- State board of education, and others involved in Primary 1-2 standards science education should introduce, where appropriate, the word 'technology' into the titles and contents of science standards, curricula, and instructional materials.
- Teacher education accrediting bodies should provide incentives for institutions of higher education to transform the preparation of all teachers to better equip them to teach about technology throughout the curriculum.

Developing a Research Base

- The state should support the development of one or more assessment tools for monitoring the state of technological literacy among students and the public in the state.
- State Department of Education should fund research on how people learn about technology, and the results should be applied in both formal and informal education settings.

Enhancing Informed Decision Making

- Industries, governmental agencies responsible for carrying out infrastructure projects, and science and technology museums should provide more opportunities for the non technical public to become involved in discussions about technological developments.
- State government agencies with a role in guiding or supporting the nation's scientific and technological enterprise, and private foundations concerned about good governance, should support executive education programmes intended to increase the technological literacy of government and industry leaders.

Rewarding Teaching Excellence and Educational Innovation

- The State Government, in collaboration with industry partners, should provide funding for awards for innovative, effective approaches to improving the technological literacy of students or the public at large.
- The Government should add a Special Award for Excellence in Technology Teaching to those that it currently offers for mathematics and science teaching.

Making use of Technology

- Make use of networked technologies to support the drive towards a learning society in our country.
- This should be a key aspect of the Government's strategy.
- Schools, has to focus mainly on improving levels of infrastructure and connectivity, and developing teachers' personal ICT capabilities.
- A programme of training for all serving teachers, using money from the Government fund is a must.

Conclusion

While 'new technologies give us opportunities to rethink educational relationships' (Poulis-Lajus and Riche-Magnier, 2000) the 'rethinking' has not been nor will continue to be straightforward. Using technology in alternative ways has been complex, uncertain and challenging. Ultimately, according to Doolittle, Hicks and Lee (2002), those involved in the learning process acquire 'multiple perspectives' on issues when technology is used to enhance social interaction with other learners, learners in remote locations, and experts. They summarise their views as follows:

Technology must be used to create authentic experiences that link new knowledge to prior

knowledge, in a socially interactive environment where questions being pursued are relevant to the student.

So when we think of heading towards 2020 let us make use of the technological innovations and try out new approaches to training and developing teachers; Carry out and use teacher research; and will share and disseminate good practice more widely.

The drive for education – and, hence, for teachers - to produce a skilled, technologically literate work force, has to get impetus. The rapid development of the information economy, the speed of globalization and industrial change, and the impact on jobs, will fuel up our heading towards 2020.

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