MULTIMEDIA APPROACH TO INORGANIC SEMIMICRO QUALITATIVE ANALYSIS

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INTRODUCTION

EDUCATION[1] is not mere imparting of acquisition of knowledge in a particular subject. Education should be a training in logical thinking and should help to arrive at the right conclusions besides imparting knowledge. It is a life long process, which begins at birth and continues till the end of life. Education should make the students to think. They should become active learners – not mere passive learners.

Education is ability to move logically from known to unknown through discovery, invention, innovation, problem solving in all major areas of societal human concerns. Aristotle quoted “Educated men are as much superior to uneducated as the living are to the dead”.

Education in the past and present

The ulterior[2] objective of education, in the past was to equip the child for spiritual and moral life. The Gurukula system characterises the most important feature of ancient Indian education. In past, teacher was an exemplary model to students for imbibing noble values.

As a result of scientific and technological development, man has shifted his way of living from spiritual to materialistic approach. Gone were

the days of Gurukulas where pupil belonged to teacher but not to an institution or school. But in modern days pupil belong to a school where teacher teaches pupil by classes and not as individuals with their uniqueness and differences.

Obstacles to effective teaching

- Large classes present problems to teachers.
- Explosion in knowledge continues and teachers are assigned newer subjects and contents to teach.
- Outside school influences compete for the pupil's interest and attention. The teacher constantly finds himself in the midst of a battle for the attention of the learner.

Active steps must therefore be undertaken to meet and overcome the obstacles created by outside communication that interfere with classroom learning. Educational research has proved that instruction can be greatly improved through the wise selection and utilization of modern media of communication. The use of audio – visual aids and modern media is justified according to the psychology of learning. Learning is based primarily on sensory experience.

The uses of some electronic aids are listed here which is essential in teaching, if the classroom is to be a place of effective instruction.

Audio - learning aids[3]

i. The Gramophone and Stereo

These are valuable aids. The voices and speeches of many great poets, dramatists, statesmen, national leaders, scientists and patriots can be heard on records and discs.

ii. The radio and Tape recorder

Special events and occurrences in the world are brought from the source immediately into the classroom. It can provide information about science, art, music, social studies, languages and current affairs. Speeches and music, drama and literary discussions, symposia and political speeches can be taped from radio programmes for listening and discussion in the classroom.

Visual Aids

i. The slide and opaque projector

One of the simplest to use visual aids is the slide projector. Slides can be made from photographs and snapshots. The opaque projector is a very

useful means for using reflected light to pick up the image of a magazine illustration, page of a book, news column or other opaque material for projecting it on to a large viewing screen. It can be used with imagination by teachers as an aid to teaching almost any subject.

ii. The Overhead Projector

There are many ways by which a resourceful teacher can make his own projection materials by using certain types of plastic sheets or by 'lifting' materials from the printed page on to a surface prepared for this purpose. The teacher faces the class while using the overhead projector and the class views the projections.

iii. The Film and Filmstrip

Documentaries showing the remarkable feats achieved in science are also available. Pupil should develop an interest in the critical viewing and discussion of films seen. Film strip is a continuous strip of 35 or 16 or 8 mm film consisting of individual frames or pictures arranged in sequence, usually with explanatory titles.

iv. Television

It is essential to provide classroom opportunities for inventiveness and creative use of factual information in traditional learning situation, this is true in the case of educational television. Television has brought a new kind of teaching team into existence. Videotapes and recording on television bring us the launching of space rockets, political and social events, visualized experiments in science and solutions for problems in mathematics.

Other visual aids such as newspaper, bulletin board, flannel board and puppets can serve as an effective aids for learning.

Computer – Assisted Instruction (CAI)

The most striking innovation in the field of educational technology is the use of computers. Computers are being increasingly employed for classroom instruction as also for individualised and distance education. The main objective of computer assisted instruction is to provide the needed flexibility for individualising the educational process. It meets the specific needs of the student in a way in which it is almost impossible to do so in a face-to-face student-teacher relationship.

Characteristics of CAI

1. The computer can evaluate a student's responses instantly and indicates whether the response is correct or incorrect on the basis of predetermined keywords identified within it. It gives hints if the student's response correspond to the anticipated incorrect answer. It would also call for a modified or new answer when the answer does not relate to any of the anticipated incorrect answers. Each student responding and receiving necessary feedback through CAI is led towards the goal of effective learning.

2. The computer can individualise instruction according to different aptitude, achievement and interest.

Advantages of CAI[4]

1. The immediate feedback provided by inter-active terminals keeps students interacting and eager to keep trying.

2. Weaker students are obliged to participate actively. They often remain passive in lectures.

3. The computer will wait patiently for an answer and will not express annoyance with wrong response.

4. Large volumes of data can be handled with accuracy and without druggery.

5. Interactive graphics makes it possible to sample many more illustrations than could easily be shown in a text book.

Information Technology (IT) support to education

- ❖ Student support through small but effective supplement of contact program.
- ❖ Mechanisation and utilization of teaching learning processes.
- ❖ Small unitised learning modules with assessment feedback.
- ❖ Quality dependent on degree of interaction possible for learning reinforcement.
- ❖ Extension of face to face contact with teacher by plurality of channels of communication.

Teaching aids in teaching Chemistry

Chemistry is not a mere preservation of facts, but an attempt at developing new skills, new attitudes and new way of thinking. By education we try to bring about some behavioural changes in the students. Students

learn best from direct experiences. But it is not possible to provide all learning situations in chemistry in their real nature. Teaching aids can reinforce the teaching of chemistry in many ways.

- To give the student an opportunity to recognise and identify practical examples of the material discussed in lectures.
- To develop skill in techniques and procedures such as operating an instrument, observing phenomena and recording data.
- To learn to process and interpret chemical data.
- It makes chemistry teaching real, virtual, vital and interesting.
- It helps to develop concepts, improve attitudes and extend appreciation and interest.
- It supplements the material of the text book.

Advantages of using teaching aids

1. By using audio-visual materials, inaccessible processes, materials, events, objects, changes in time, speed and space could easily be brought to the class. It helps to extend human experience.

2. It provides first-hand experiences in a variety of ways and sometimes make the pupils actively participate. It results in greater acquisition of knowledge of facts and ensures longer retention of the information gained.

3. By using suitable audio-visual materials, any expected change in attitude and behaviour could be facilitated.

4. It supplies a concrete basis for conceptual thinking, giving rise to meaningful concepts.

5. Audio-visual materials could be used to motivate and stimulate interest of pupils to gain further knowledge.

6. It can develop an awareness of problems, open up possibilities for exploration, present meaningful preliminary information and thus open avenues to new activity.

Teaching Technology at College Level

i. Lecture Method[5]

Lecture is generally described as a teacher – oriented teaching method involving one-way communication procedure. It started as a formal discourse wherein a learned person exposed the complexities of a topic or subject to a motivated audience. It also provides group feelings, social reinforcement and emotional security. For the success of a lecture, some of the special characteristics of the learned person such as depth of knowledge, ability to explain etc., were responsible.

ii. Seminar

In higher education, the term, 'seminar' is generally used to refer to a structured group discussion, that may precede or follow a formal lecture, often in the form of an essay or a paper presentation. It becomes an appropriate mode of instruction when the level of attainment of the group is relatively high and the subject matter lends itself to analytical treatment.

iii. Symposium

Symposium is a discussion by different specialists and speakers on the same topic, emphasizing or dealing with different aspects of the same topic.

Selected persons present prepared speeches. Each speaker limits his presentation to a particular aspect or area.

iv. Panel Discussion

A panel discussion is yet another method of instruction. Two or more speakers discuss various aspects of a single topic and present it to a group of students or teachers. The panel members interact with each other with a good degree of spontaneity and anticipate the questions that may arise from the audience. It provides facts and stimulates interest in the selected topic.

v. Team Teaching

Team teaching, an innovative programme in education is an attempt to improve the instructional programme. It is a process involving team work of two or more teachers, who plan, execute and evaluate the learning experiences of a group of students. It centres on the needs of the students.

vi. Project Approach

It is “a significant, practical unit of activity having educational value and aimed at one or more definite goals of understanding”. It involves investigation and solution of problems and frequently the use and manipulation of physical materials, planned and carried to completion by

pupil and teachers in a natural ‘real-life’ manner. It provides a model of self-education.

vii. Workshop

Educational workshop is a get-together for some creative educational activity. While discussion, demands much talk, workshop is a ‘shop for work’, where work is done and it is not a ‘shop-talk’. It is an activity-oriented technique. Recording and reporting the produced work at the preliminary session is an important aspect of the workshop.

Technology based learning and teaching

E-Learning

E-Learning[6] is the unifying term to describe the fields of online learning, web-based training and technology – delivered instruction. It is the use of network technologies to create, foster, deliver and facilitate learning anytime and anywhere.

e-learning can be described as using technology to increase the effectiveness and accessibility of learning. In particular, it’s the convergence of the internet and learning, or internet-enabled learning that is empowering

organisations to quickly provide customers, partners and employees with consistent, just-in-time education and training.

Myths about e-learning

- It is tough to define the exact scope.
- It is further, tougher to arrive at effort estimation.
- Deliveries will take months or years.
- Cost of development is high and indefinite.

The Truth

- Scope and effort are absolutely quantifiable in a e-learning content development.
- e-learning content projects are cost effective.
- e-learning content development are deliverable in a few weeks.
- Most in-house e-learning content development fails due to lack of resources, well defined process and management.

Presenting Ten Acado, a web based e-learning platform

However, remarkable[7] a concept e-learning is, its application so far has only resulted in a stark dilution of the classroom setting, leaving the student and machine in total isolation. Education for the global citizen is not an alienated affair. Students of the world today look forward too much more from an educational institutions – cutting edge learning, an experience, beyond the classroom, measurable success and an overall impressive institutional image as a sought after centre of excellence. These challenges are effectively addressed by Acado.

Acado is not just an e-learning platform. It is a completely web-based intranet solution for academic institutions. It creates learning content in rich media, providing model for learning objects, serves as a platform for collaboration much beyond the confines of a classroom or institution, integrating tools and templates which help faculty members to create and administer e-learning content, based on their independent style and need.

Learning effectiveness is enhanced by Acado's course support tools that foster interaction between faculty and student, enable performance tracking, student alert in case of specific events.

What is Multimedia?

Multimedia[8] is any combination of text, graphic, art, sound, animation and video delivered by computer or other electronic means. It is richly presented situation.

Multimedia will provoke radical changes in the teaching process during the coming decades, particularly smart students discover that they can go beyond the limits of traditional teaching methods.

Evaluative Devices

The primary responsibility of a teacher is to bring about the maximum degree of achievement in learning. Evaluation occupies an important place in the educational process. It enters into every aspect of the teaching learning relationship. 'To evaluate' means "to ascertain the value or amount of appraise carefully". Hence, evaluation is the judging of the worth or value of something that represents the satisfaction of a human need such as an object, event or activity. It is assumed that evaluation will influence teaching and learning . Students who are rated or examined periodically will work harder on their studies.

Some devices of evaluation

Among the devices of evaluation, there are examinations and tests of all types, oral quizes, rating scales, behaviour records, interviews and individual conferences.

i. Objective type examination or new type tests

A large number of questions and statements are provided and students are asked to answer them by making the correct responses in some prescribed way, i.e., by ticking the right response, by drawing a circle round the right answer, by completing a sentence etc., These tests can serve as excellent teaching devices because the teacher will find them extremely useful in checking his own work or of his pupil. These tests reveal how much or "what ground has been adequately covered and what ground the pupil is still enveloped in fog".

ii. The oral quiz

It consists of a series of questions to be asked orally. It is comparatively unreliable and time-consuming because it is to be used with each person individually. Students have to form answers on the spur of the moment; the teacher, too, has to evaluate the answer then and there.

iii. Standardized Tests

They are valid, reliable and objective. They have been administered to a large number of cases before they have been finalised. The purpose of a standardised test may be only to assess the capacity, brightness or native intelligence of individual as compared with the norm for his age.

iv. Rating Scale

It is a standardised method of recording interpretations of behaviour. Individuals are rated on a scale from low to high with respect to a particular trait. Teachers who rate should have a clear grasp of the trait to be rated and should be prepared to compare their judgement with that of others.

v. Behaviour Description

It may be teacher's description of the action and reactions of students in certain situations- in the classroom, in the playground, in a free period. Correctness of description will to some extent depend on the correctness of observation made.

vi. Attitude Tests

This measures attitudes. An attitude is a complex of feelings, desires, fears, convictions, prejudices or other tendencies that have given a set or readiness to act, to a person because of varied experiences.

ii. Interest Inventories

These are designed to measure interests, theoretical, economic, aesthetic, social, political and religious.

REVIEW OF LITERATURE

Dow Ruth Mcnabb[9] compared the effectiveness of a computer slide presentation and classroom teaching. It was found that computer slide presentation showed greater achievement than conventional method.

David P. Ausubel[10] emphasised that meaningful learning occurs when new knowledge is linked to what a student already knows. He suggested that while planning, it was important to identify in advance ways to relate new knowledge to some broad concept or generalisation already familiar to students.

Darnowski[11] stated that for individual learning, small pieces of information in an instructional sequence were presented to the students. As they respond to questions about the information, correct answers could be provided so that they could check the validity of their responses. He also stated that media of communication other than teacher's voice and written text would be supplemented with various audio-visual materials through the employment of a computer.

Thomas Good[12] conducted a slide presentation study in Britain aiming at improving children's comprehension in slide presentation program. Twenty three third grade children participated for 15 minutes per day,

viewing slide presentation for weeks. The programme included science. It was found that training improved their comprehension. After each programme they were asked to complete work sheets. Such student answered more questions correctly.

Mc Kenzie[13] stated that there were number of advantages in describing undergraduate computer assisted learning in biology, chemistry and physics.

Moore[14] developed project SERAPHIM (an acronym for System Engineering Respecting Acquisition and Propagation of Heuristic Instructional Materials) to provide microcomputer software packages for chemical educators by collecting, producing and disseminating instruction.

Arthur D. Little[15] developed a computer software program called CHEMEST to estimate physical and chemical properties of organic chemicals. He reported that CHEMEST could dramatically reduce the time and cost needed to obtain chemical property data. The properties that could be estimated include:

- Bulk-thermodynamic properties – melting point, boiling point and vapour pressure.
- Solution properties – solidity in water, Henry's Law Constant, Thermodynamic Activity Co-efficient.

Environmental properties – soil absorption co-efficient, fish bio-concentration factor and rate of solute volatilization from water.

Raman,[16] Paulraj and Ramalingam had written a program to initiate students to use computer for solving chemical problems like the potentiometric titration-calculations. They calculated for Iodide and chloride mixture vs silver nitrate, potassium hydrogen phthalate vs sodium hydroxide, cobalt (II) vs Ferricyanide and Iodide vs Permanganate.

Floresca Cawagas[17] dealt with the issue of evaluating value education programme – its concepts and principles. She argued in favour of need for assessment at every stage, the formative evaluation. She warned that if no assessment was done during the programme, teachers just taught about values in the same, old academic fashion instead of encouraging creative active learning and providing role models on how these values should be lived.

Prakash and Raghavan[18] conducted an experiment on titration using a microcomputer. They concluded that the use of microcomputer in titration experiment was highly beneficial to students.

Manjula[19] adopted a computer program in TURBO PASCAL for computerising dictionary of organic compounds.

Srividhya[20] studied the verification of viscosity equation of strong electrolyte solute and computerised the calculations involved using “C” program.

Silicon Graphics[21] teaching laboratory facility was available to all researches in the Cambridge University Chemical Laboratory and to final year Undergraduate Chemistry Students.

An introduction[22] to surface, science, adsorption, desorption, XPS, AES, Photoelectron, Difraction, Vibrational Spectroscopy, Langmuir, Catalysis were available.

Movies on chemistry[23] the study of change, chemical kinetics, chemical equilibrium, atoms, molecules and ions, physical properties of solution, acids and bases, transition metals chemistry and co-ordination compounds and other chapter were available.

Similar Projects

Analysis of cation,[24-28] information about chemical laboratory, chemistry and the tests in the qualitative analysis were available.

Chemistry E-Learning at Oxford

It involved[29] the implementation, E-Lectures, Virtual experiments, Online workshops, Example classes, E-Courses reasons etc.,

Education E-Learning.

On-line[30] resources for students, educators and scientists were available on the chemistry hypermedia project home page. Information about instrumentation, analytical chemistry, general chemistry, problems related to equilibrium were also provided.

The ChemTeam[31] a tutorial for high school chemistry provided study resources in all standard topics for students in high school and advanced placement chemistry.

Rader's CHEM4KIDS.COM[32] provided information about matter, atoms, elements, reactions and biochemistry.

Chemical separations[33] could be viewed with a browser that supports forms. This gave an brief account of virtual classroom. Introduction to principles of chemistry, general, organic and biochemistry for I and II undergraduate levels were available.

Mike Colvin's[34] quantum chemistry class involved the calculation of chemical properties directly from the molecular schrodinger equation.

Gayathri[35] studied the effect of e-learning on school children from standards I to IV. By comparing the results of pre test and post test she concluded that there is a difference in their level of understanding the

concepts between the usage of conventional method of teaching and that of visual method of teaching like e-learning.

Amsath Begum[36] studied the effect of e-learning on school children from standards V to VIII. She concluded that e-learning method is more effective than chalk and talk method in teaching the science concepts to the middle school children.

Savitha Gautam[37] reported that the science centre in Singapore made learning science simple. There's a huge replica of the periodic table with a control panel with the names of the elements. By pressing the button of any element a cartoon appeared and told all about that element. Practical experiments were conducted for kids to learn and watch.

Camet[38] multimedia in association with kids kamp organised a camp and the children were grouped according to age and interest. Instructions about arts and crafts, language skills, multimedia, internet, web designing, image manipulation and animation were given. The work done by the children at the end of the course enhanced the power of creativity. Videos and puppet shows showed children a glimpse of vedic wisdom.

AIM AND SCOPE OF THE PRESENT INVESTIGATION

Qualitative analysis[39] is concerned with finding out or identifying the constituents in an unknown substance, say a mixture of salts. It is a discipline in itself. It serves to develop the qualities of students and careful manipulation and imparts very important training in making careful observations and drawing logical conclusions there from. A single qualitative analysis illustrates in its entirety, the “Scientific Method”.

About thirty years back, the inorganic chemistry curriculum had almost dealt with the preparation and properties of inorganic materials, thus making the subject not so attractive for students. Due to rapid advancement of new theories, more and more theoretical concepts were introduced in the curriculum. Students are made to learn a number of abstract theories; the interesting aspects of reactions in inorganic chemistry, especially the experimental aspects and basic principles have been relegated to the background. This has eliminated the joy of learning inorganic chemistry by the students. The students fails to correlate the theories with the activities in the laboratory as if they were two independent, unrelated components of chemistry though they are tout ensemble. Consequently their practical classes have been rendered dull and are deemed a burden rather than an

excitement by them. Under these circumstances, the chemistry students function only like technicians and not like explorers of science in their college laboratories.

To correct this anamoly and make learning inorganic chemistry a pleasure rather than a pain for the students, the present work is undertaken.

The main objectives of the present study are:

1. To collect the procedure for testing varieties of anions and cations by referring to different analytical chemistry text book.

2. To design PowerPoint slides for each anion and cation illustrating preliminary reactions, dry reactions, wet reactions and spot tests with the principle behind the analysis.

3. To describe elaborately the elimination procedure for selected anions, group analysis of cations and test for rare cations.

4. To provide general procedure for the analysis and a model procedure for the analysis of a salt.

5. To set multiple choice questions at under graduate and post-graduate level and to enter it into a web based quiz program from which

questions can be selected randomly to evaluate the understanding of students.

6. To prepare a CD containing all these e-learning materials (Power Point slides and quiz programmes), which can simulate chemistry laboratory experience to a chemistry / non chemistry students in the absence of irritation by fumes and heat.

EXPERIMENTAL METHODS

Science is all inclusive and very comprehensive and touches the life of everyone in more ways than we can imagine. It has taken huge strides during the last 4-5 decades. Its achievements, discoveries and inventions have been really fantastic and wonderful. It has been pushing forward with a terrific speed in every walk of our lives. Life without science and its various boons is unthinkable. Science has made life easy, convenient, comfortable, better and made many dreams come true. Man is now on board in excellent ship of science in the vast and uncharted ocean of knowledge. So, he is ready to face any challenge, brave any storm, however violent and strong. The search, the quest for the truth goes on, on and on.

In olden days education was teacher centered. But in the recent tooling up of the educational style, the teacher need not be physically present to teach. Of late both the students and teachers are vitally concerned with the question of acquiring information most rapidly and efficiently. Various teaching techniques have been developed and tested and some have proved their efficiency in this respect.

The learning material and the evaluation technique were given in a CD-ROM (Compact disc – Read only memory). Both of these can work in any operating system (Windows / Linux) which has a web browser (JavaScript enabled) and ability to display PowerPoint. No installation was required.

System Requirements

1. Intel Pentium II processor
2. 32 MB RAM
3. Windows or Linux Operating System
4. Colour Monitor
5. PowerPoint
6. JavaScript supported Web Browser
7. CD – ROM Drive and
8. Mouse

Learning material for inorganic qualitative analysis was prepared by referring to different analytical chemistry text books.[40-42] The procedure for

testing varieties of anions and cations were collected (Table – 1-3). PowerPoint slides were designed for each anion and cation illustrating preliminary reactions, dry reactions, wet reactions and spot tests with the principle behind the analysis. The elimination procedure for selected anions, group analysis of cations and test for rare cations were described elaborately. General procedure and a model procedure for the analysis of a simple salt were prepared. This learning material simulates chemistry laboratory experience to a chemistry / non chemistry students in the absence of irritation by fumes and heat.

Table - 1

ANIONS	CARBONATE
	SULPHATE
	CHLORIDE
	BROMIDE
	IODIDE
	NITRATE
	SULPHIDE
	BORATE
	ARSENATE
	ARSENITE
	PHOSPHATE
	OXALATE
	FLUORIDE

Table - 2

CATIONS

CATIONS	LEAD
	MERCURY
	SILVER
	BISMUTH
	COPPER
	CADMIUM
	ARSENIC
	ANTIMONY
	TIN
	IRON
	ALUMINIUM
	COBALT
	NICKEL
	MANGANESE
	ZINC
	BARIUM
	STRONTIUM
	CALCIUM
	AMMONIUM
	MAGNESIUM

Table - 3

CATIONS AT POST GRADUATE LEVEL

CATIONS	TUNGSTEN
	SELENIUM
	PLATINUM
	PALLADIUM
	TELLURIUM
	CERIUM
	THORIUM
	THALLIUM
	ZIRCONIUM
	TITANIUM
	CHROMIUM
	VANADIUM
	BERYLLIUM
	URANIUM
	LITHIUM
	RUBEDIUM
	CESIUM
	SODIUM
	POTASSIUM

Multimedia, MS Office and MS PowerPoint were the tools used to prepare the learning material.

MULTIMEDIA

Multimedia is a powerful tool for instruction. Multimedia is the incorporation of sound, animation, still images, hypertext and video integrated under the control of the computer program. Multimedia can make users to experience the real life situations and their consequences by interacting with computer. Students of chemistry can see live demonstration of the chemical reaction of an experiment. It influence the process of education and training significantly. The essence of multimedia is to make chemistry more interesting. As a result of this teaching and learning becomes more easy and fun-filled.

EFFECT OF MULTIMEDIA IN EDUCATION

The introduction of multimedia computer can help to change the present teacher-oriented system to a student – oriented one. Trainees study at home using a multimedia software at their own place and rhythm.

The other benefits of multimedia are

- Easy to learn and operate.

- Animation in the diagram facilitates quick understanding.
- Multimedia storage and retrieval system can contain more information than any human teaching can do.
- Graphs and diagrams can be reproduced perfectly.

In coming decades teachers may become more like guides and mentors along a learning path, not the primary providers of information and understanding the students become the core of the teaching and learning process.

MS-OFFICE[43]

Microsoft office is a series of programs developed by Microsoft to take advantage of computing power in the office. MS-Office contains

MS-Word (Word Processing)

MS-Excel (Spread Sheets)

MS-Access (Data bases)

MS-Outlook (E-Mail)

MS-Powerpoint (Slide Show Presentation)

MS-Front Page (HTML – Editor – Web Design Software)

MS-Word (Word Processing)

MS-Word is used to compose letters, reports, essays etc.., It also contains many templates for creating documents from CVs to envelope labels. It allows to change the font size, font type, font colour etc.., of text and alter the formatting of the paragraph – all with an inbuilt and automatic spell checker. It is used to create visually exciting document that can contain drawings, tables, charts etc.,

MS-Excel (Spread Sheets)

MS-Excel is used to create the spreadsheets which are used primarily for storing and manipulating numerical data. Excel is designed to calculate data and present it in a clear and attractive manner. It provides various chart or layout options to enhance spreadsheets.

MS-Access (Databases)

Access is a relational database management system (RDBMS). Access stores and retrives data, presents information and automates repetitive tasks. It can reduce the complexity of data by giving access to all types of data and to use more than one database table at a time. Access is a

set of tolls for end-user database management. It has a table creator, a form designer, a query manager and a report writer.

MS Outlook

MS Outlook is an e-mail programme. It is used to compose, send and receive e-mails. It is pretty simple.

MS PowerPoint

MicroSoft PowerPoint is a presentation aid software developed by Microsoft. It helps to present our ideas clearly and concisely, augmented by pictures, sound even video.

When you start powerpoint, the new presentation dialog box offers four choices:

Auto content wizard gives a series of questions designed to elicit information about the user and the type of presentation.

The wizard then builds a dummy presentation that guides the user in developing the content of the presentation.

Design template allows the user to establish the background and colour scheme from the available templates.

Blank presentation opens a new presentation with no template.

Auto layout

After opening a new presentation, PowerPoint displays the new slide dialog box containing several auto layouts. It provides a pre-determined layout for each specific type of slide. They provide consistency throughout the presentation.

Using place holders

All but two of the auto layouts supply pre-selected places called place holders in which the text is inserted. It is important to insert text into each “title” placeholder because PowerPoint uses that information to help the user, while moving to a different slide.

Text

Options on the text tool bar allows the user to make choices affecting highlighted test.

Drawing

The drawing tool bar contains the tools to incorporate objects into a presentation.

Inserting New Slides

New slides are added after the current one by clicking the new slide tool. Then the layout of the new slide is chosen from the new slide auto layout dialog box.

Applying Design templates

PowerPoint calls it built-in colour schemes design templates. The user can apply a design at any point during development.

Slide colour scheme

In the slide colour scheme dialog box, the standard tab allows to choose a pre-determined colour scheme by clicking on the desired choice.

Working with text

To change the format of the text, the text to be changed should be highlighted. Making a selection from the text tool bar affects the highlighted text only. In addition to the standard text formatting tools of font choice and size, bold, italics and underline alignment can also be made.

Increase / decrease paragraph spacing

The increase and decrease paragraph spacing tools expand and contract paragraph spacing respectively.

Increase / decrease font size

Font size of highlighted text can be increased and decreased by clicking on the increase font size or decrease font size tool respectively. Size increments and decrements by the standard font sizes.

Drawing objects

To draw a line, an arrow, a square or a circle there are appropriate tools in the drawing tool bar.

Fill colours

When solid objects were drawn, they fill with the automatic colour. The underline under the paint bucket is the current fill colour. To change the current fill colour, new selection can be made by dropping down the arrow beside the paint bucket.

Auto shapes and word art

If the user is not particularly artistic, autoshapes and word art comes to the rescue.

Animating the presentation

The text and object can be animated. To animate text, from the drop-down box, choose whether the text is introduced all at once, by word, or by letter.

Giving an on-screen presentation

Slide show view allows the user to view the presentation on the computer monitor as the audience will see it projected.

MS Front Page

It is used to create websites. It basically gives the ability to design a site like a graphic design package, then creates the code for it.

Evaluation[44-45]

Evaluation method involves the preparation of multiple choice questions for both undergraduate and post graduate level.

Technologies used

i. HTML

ii. JavaScript

Environment required

Any web browser supporting JavaScript (Internet explorer 5+, Netscape navigator 7+, Opera 7+ . . . . .)

At undergraduate level 120 questions were set up and entered using web based quiz program. Each attempt displays thirty randomly selected questions. For each question four choices were shown and the user is allowed to select one of them. After answering all the thirty randomly selected questions the user can click "*check my answer*" button. The results were shown in the following format.

i. Question

ii. User's answer

iii. Result

If the selected answer is wrong correct answer will be displayed

iv. Percentage of marks scored

Similarly, at post graduate level seventy questions were prepared and entered using web based quiz program. Each attempt displays twenty randomly selected questions.

INTERNET

The internet[46] is an inter-connection between several computers of different type belonging to various networks all over the globe. It is network of networks. It is a group of two or more networks that are

- Interconnected
- Capable of communicating and sharing data with each other.
- Able to act together as a single net work.

Internet is the cheapest and fastest means to

- Get information
- Provide information and
- Compiling information

Getting information on the internet

Information about people, products, organisations, research data, electronic versions of the printed media etc., can be obtained from the internet using programs such as Gopher and world wide web (www).

Providing information on the internet

- Publishing including full text articles, reports, illustrated articles, abstracts, computer programs and demonstrations.
- Extension in which some of the delays associated with the printed media may be reduced.
- Teaching, the possibilities here include both distance learning and assistance for students.

Compiling information from the internet

This is another form of "getting" specialised information. Using forms, e-mails, etc one can conduct surveys, get opinion of people across the world.

HTML[47]

HTML stands for Hypertext Markup Language. Hypertext is the content of a document that includes text, pictures and links to others related documents. It is used to create web pages. HTML is an immensely flexible and varied language. It can be used to display any type of document that is available on the web. The computer that maintains the document (host

computer) and the computer that displays the document may be at different geographical locations. HTML is a versatile language and can be used on any platform or desktop. Being platform independent, documents written in HTML can be viewed on any computer that runs on any operating system.

HTML[48] indicates the manner in which the document is to be read by the browser, like the Microsoft Internet explorer; about the action to be taken when a certain element is specified. The appearance of a web page is important and HTML provides tags to make the document look attractive. Use of graphics, fonts, different sizes and colour can enhance the presentation of a document.

HTML[49] allows the creation of hypertext links, also known as hyperlinks, to other documents or other portions of the same document. There is no limit to the kind and type of information that can be disseminated through the web page by using this versatile language. It is not case sensitive.

JAVASCRIPT

JavaScript is the only scripting language currently supported by the popular web browsers. It can extend the usefulness of web pages beyond

HTML. It is lines of executable computer code and is usually embedded directly in HTML pages.

JavaScript can put dynamic text into an HTML page. A JavaScript statement is like this.

Document. Write (“<h1>” + name + “</h1>”) can write a variable text into an HTML page. It is an interpreted programming language. Interpreted means that the entire web page is downloaded to the browser and the JavaScript code is executed when an event is triggered. When the code is executed it is interpreted one line at a time. There are a number of events that will trigger the execution of a JavaScript, like a click on a form button, or the completion of a web page loading.

JavaScript also supports functions, without any special declarative requirements.

Hot Potatoes[50]

Hot Potatoes is the recently available method for evaluation. It includes six application enabling to create interactive multiple – choice, short answer, jumbled-sentence, crossword, matching / ordering and gap-fill exercises for the world wide web.

ALGORITHM 1

Procedure to view the PowerPoint presentation

Step 1: Insert the CD into CD-drive of the computer.

Step 2: Open the windows explorer and browse the CD.

Step 3: The CD would contain two directories

i. PowerPoint slides

ii. Quiz

Double click the directory name “Power Point Slides”

Step 4: This directory contains the learning material for qualitative analysis in the form of slides. File names correspond to cation or anion name. Double click the file that has to be viewed.

Step 5: The presentation opens and the first slide is shown. Use keyboard or mouse to traverse through the presentation.

Step 6: Press “Esc” key to exit from the presentation.

ALGORITHM 2

Procedure to enter into the quiz program.

Step1: Insert the CD into CD-drive of the computer.

Step2: Open the windows explorer and browse the CD.

Step3: The CD would contain two directories

i. PowerPoint slides

ii. Quiz

Double click the directory named “Quiz”.

Step 4: Double click the file named quiz_main .html.

Step5: The page opens in a web browser. This page contains two links. One link refers to undergraduate level and another link refers to post graduate level.

Step 6: Click on the quiz level to start the quiz.

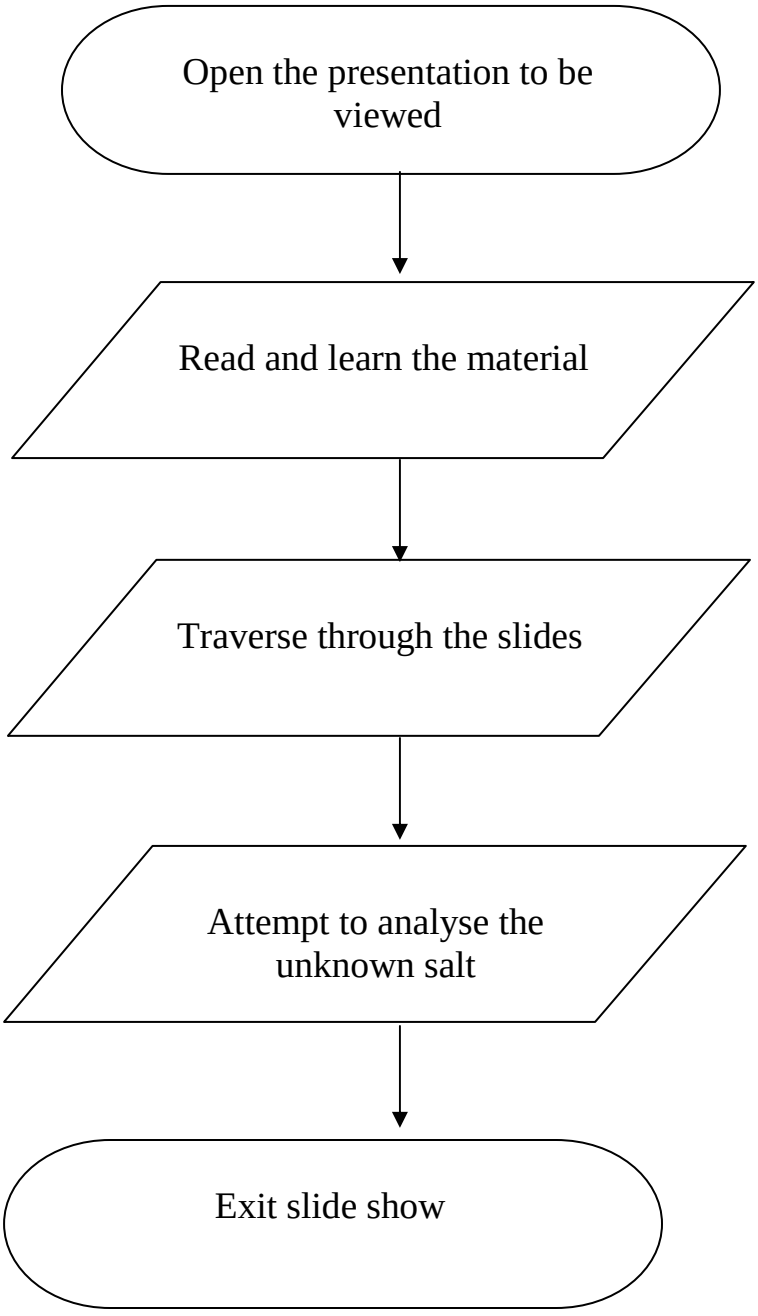
Step 7: Another page opens with questions.

Step 8: For each question there are four options. Select one answer for each question.

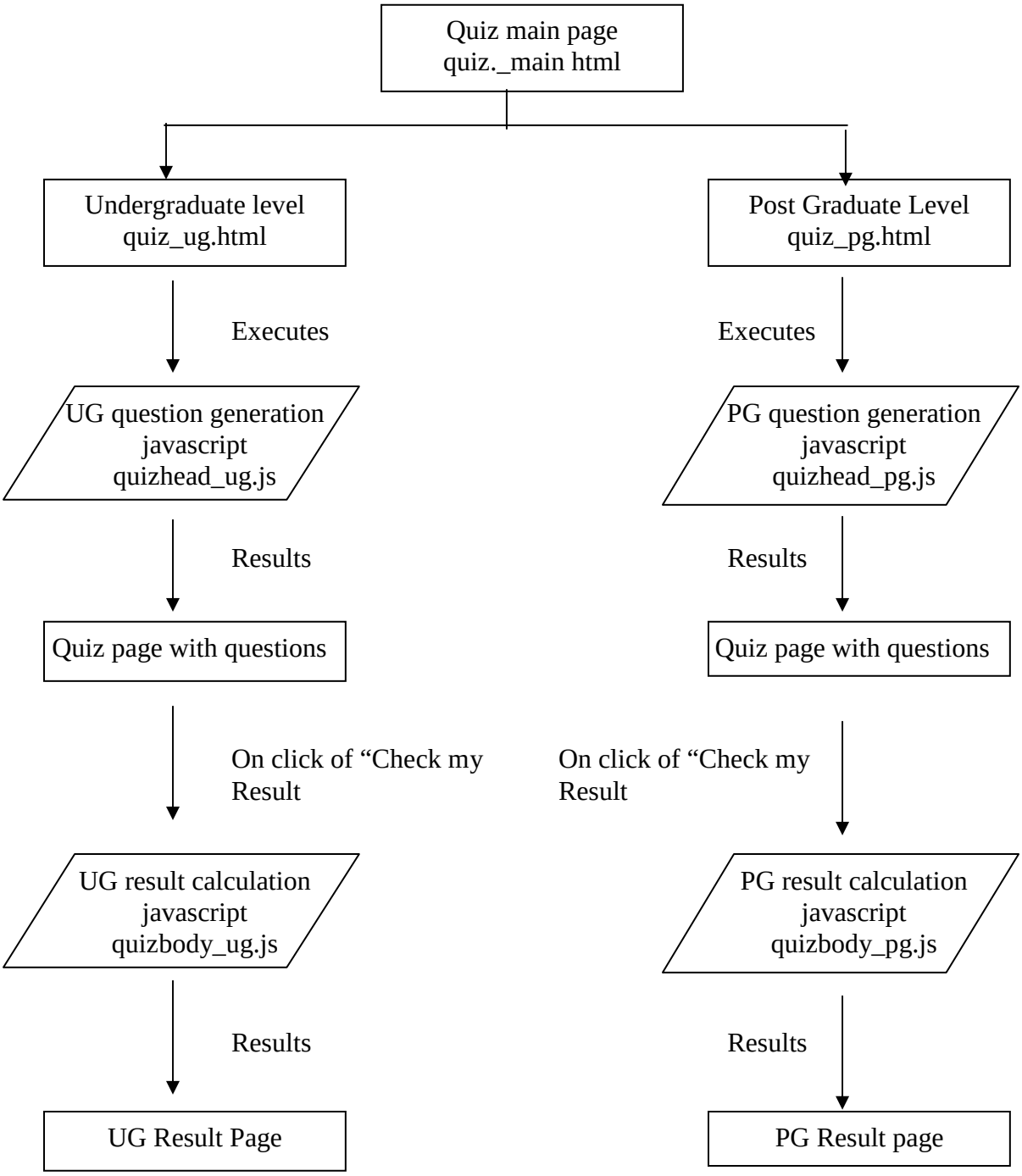
Step 9: After answering all the questions, press the button at the bottom of the page named “Check my result”.

Step 10: The page containing the result of the quiz opens. Close the browser window after viewing the result.

Learning material



Quiz


Quiz main page
quiz._main html
Undergraduate level
quiz_ug.html
Post Graduate Level
quiz_pg.html
Executes
Executes
UG question generation
javascript
quizhead_ug.js
PG question generation
javascript
quizhead_pg.js
Results
Results
Quiz page with questions
Quiz page with questions
On click of “Check my Result
On click of “Check my Result
UG result calculation
javascript
quizbody_ug.js
PG result calculation
javascript
quizbody_pg.js
Results
Results
UG Result Page
PG Result page

RESULTS AND DISCUSSION

It is hardly recognised that science teaching needs special skills, imagination and a thorough understanding of the subject. Teachers have to cover vast portion, set-up questions, conduct periodical exams and evaluate answer sheets. Hence they have no time to prepare their own teaching aids, laboratory demonstrations or even a field visit to observe science in nature. Practicals in science have never received the due attention and importance which they demand. This is particularly true of chemistry. Only a few students are drawn towards practicals with interest and seriousness to verify existing theories and principles. However, what is basically lacking is kindling scientific curiosity in the young minds, keenness of observation, sorting out facts, asking the right questions and trying to find the right answers through methods of science.

Learning based on technology aims to promote fast and efficient learning. It forms virtual learning communities/classrooms. Due to rapid development we are moving away from a mere (chalk and talk) and (spray and pray) lecture format to the creation of an interactive learning event. The effectiveness of an e-learners experience is greatly enhanced through student

- centered origin. Creative and skilled use of e-learning resources can shift the model of learning from

Stage 1 - Replacement

Stage 2 - Enhancement

Stage 3 - Transformation

PowerPoint slides were prepared for a variety of anions and cations with the basic principle behind each test. The general procedure for the analysis and a model procedure for the analysis of a simple salt were prepared. The prepared powerpoint slides for anion, cation and a model procedure for the analysis of simple salt were listed.

Multiple choice questions were set up for both undergraduate level and post graduate level by referring to various analytical chemistry text books. For the undergraduate level 120 questions were prepared and entered into web-based quiz program. Each attempt displays thirty randomly selected questions. Seventy questions were prepared for post graduate level and entered into web-based quiz program. Each attempt displays twenty randomly selected questions. After answering all the questions they can check their answers. If the selected answer is wrong, the correct answer is

shown to the student. The percentage of marks scored by the user is also displayed. Screen shots of evaluation technique were given.

Hazards in chemical laboratory

In a general chemistry laboratory[51], some chemicals were toxic and poisonous in nature. Prolonged exposure to the vapours of these chemicals create health problems. Some of these were lethal when ingested even in small amounts. Formation of fumes is very common in chemical laboratories which cause irritation. Frequent exposure to chemical fumes is a sure way of contracting diseases with lungs.

But this new method of learning provides the laboratory experience in the absence of irritation by fumes and heat. Chemistry lab brought to home without corrosive chemicals. This method of learning leads to a pollution free environment.

Based on the stability, solubility, availability and cost factor the following salts are given for analysis as simple salts and in some combination mixtures at the undergraduate level. The students can perform virtual learning by viewing any salt.

Table – 4

LEAD	ARSENATE
	ARSENITE
	NITRATE
	IODIDE
	BROMIDE
	BORATE
	OXALATE
	FLUORIDE
	PHOSPHATE
	CARBONATE
	SULPHIDE
COPPER	CHLORIDE
	FLUORIDE
	SULPHATE
	BORATE
	OXALATE
	PHOSPHATE
	CORBONATE
BISMUTH	PHOSPHATE
	CARBONATE
	CHLORIDE
	BORATE
	OXALATE
	FLUORIDE
CADMIUM	PHOSPHATE
	CARBONATE
	IODIDE
	SULPHATE

CADMIUM	OXALATE
	SULPHIDE
	BROMIDE
ANTIMONY	SULPHIDE
	PHOSPHATE
	CARBONATE
	OXALATE
	BORATE
FERROUS	SULPHATE
	OXALATE
FERRIC	CARBONATE
	SULPHATE
	OXALATE
MANGANESE	FLUORIDE
	CARBONATE
	OXALATE
	BORATE
	ARSENITE
	ARSENATE
	PHOSPHATE
	SULPHATE

ALUMINIUM	PHOSPHATE
	FLUORIDE
	SULPHATE
ALUMINIUM	CARBONATE
	BORATE
	OXALATE
ZINC	PHOSPHATE
	OXALATE
	CARBONATE
	ARSENITE
	ARSENATE
	SULPHATE
	SULPHIDE
	BORATE
NICKEL	BORATE
	ARSENITE
	ARSENATE
	CARBONATE
	SULPHATE
	PHOSPHATE

COBALT	PHOSPHATE
	CARBONATE
	ARSENITE
	ARSENATE
	SULPHATE
BARIUM	CARBONATE
	PHOSPHATE
	FLUORIDE
	ARSENITE
	ARSENATE
	CHLORIDE
	BROMIDE
	NITRATE
	BOARATE
	OXALATE
CALCIUM	BORATE
	CARBONATE
	ARSENITE
	ARSENATE
	BORATE
	PHOSPHATE
	FLUORIDE

STRONTIUM	NITRATE
	BROMIDE
	CARBONATE
	PHOSPHATE
	FLUORIDE
	BORATE
	OXALATE
MAGNESIUM	CARBONATE
	PHOSPHATE
	BORATE
	OXALATE
	FLUORIDE
	SULPHATE
	ARSENITE
	ARSENATE
AMMONIUM	CHLORIDE
	CARBONATE
	PHOSPHATE
	SULPHATE
	BROMIDE
	OXALATE
	BORATE
	CHLORIDE
	IODIDE
	FLUORIDE

CONCLUSION

In today's world where social and technological changes are taking place rapidly, the teacher can no longer be the sole source of imparting information in the classroom. Therefore new methods should be adopted to improve the quality of education. Technology enhanced learning extends learning beyond the classroom. By bringing technology into the classroom, learning can be made more lively and relevant. Teaching – learning process can be made more effective by e-learning.

E-Learning which includes computer-based training and web-based training is changing globally time tested practices involved in imparting knowledge and skills. Internet and www have developed into an incredibly large knowledge repository, available to anyone, anywhere, anytime. Instructor-led traditional classroom sessions are replaced with real-time virtual conclusions. The teacher need not be physically present to teach in this method.

PowerPoint slides were prepared for 12 anions and 37 cations with the basic principles behind each test. The general procedure and model procedure for the analysis of simple salt were given. By referring to these procedures they can analyse any kind of salt. Multiple choice questions were

prepared at both undergraduate and post graduate level enables self evaluation. Students can gain practical knowledge in the absence of fumes and heat by this method of learning.

This work may be extended to organic and physical chemistry. In future presentation would be published in web so that usage can be extended to students all over the world.

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Qualitative analysis of inorganic compounds allows to determine a composition both individual inorganic substances and their mixtures. The majority of nonorganic compounds are electrolytes and behave as ions in water solutions. According to that the qualitative analysis of inorganic compounds is divided into the cations and anions analysis. According to their properties, cations are classified into groups. Each group has a common reagent which can be used to separate them from the solution. Qualitative research involves collecting and analyzing non-numerical data (e.g., text, video, or audio) to understand concepts, opinions, or experiences. It can be used to gather in-depth insights into a problem or generate new ideas for research. Qualitative research is the opposite of quantitative research, which involves collecting and analyzing numerical data for statistical analysis. Qualitative research is commonly used in the humanities and social sciences, in subjects such as anthropology, sociology, education, health sciences, history, etc. Content analysis is a widely used qualitative research technique. Rather than being a single method, current applications of content analysis show three distinct approaches: conventional, directed, or summative. All three approaches are used to interpret meaning from the content of text data and, hence, adhere to the naturalistic paradigm. Introduction Inorganic chemicals have enormous industrial and commercial importance. For example, the single largest chemical produced in the world is sulfuric acid. Therefore, being able to identify and to understand the reactivity of inorganic species is important, and is the topic of this experiment.Â References/Bibliography: For purposes of the lab writeup, you might want to use: General information: Miessler and Tarr, Inorganic Chemistry, 3rd Edition (2351 text) Zumdahl and Zumdahl, Chemistry, 8th Edition (1110/1130 text) redox chemistry: Wulfsberg, Inorganic Chemistry (library course reserve) specific tests: Vogel, Textbook of Macro and Semimicro Qualitative Inorganic Analysis, 5th edition (library reserve, QD 81 V87.