Book Title

■ **Fostering Teaching Learning Practices for Quality Enhancement in Higher Educational Institutions**

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Covid 19 and Role of ICT Tools in Chemistry Education

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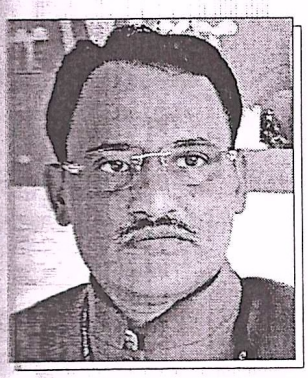

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Abstract :

Covid 19 is a contagious disease caused by a new Coronavirus strain. It was labelled a global epidemic, affecting nearly every element of human life. Due to the temporary closure of all educational institutions, the teaching-learning process was disrupted. This discontinuation of teaching learning process in the school and university may have deep impact on the education sector in India but also on the economic and societal system. In light of the Covid 19 issue, teachers' roles have shifted dramatically. In the dark days of Covid 19, ICT tools in schools and universities were a glimmer of hope. To assure the continuity of instruction, the teachers swiftly turned to distant learning When face-to-face teaching became impossible due to the Covid 19 outbreak, ICT proved to be a boon to reduce the barriers between teachers & studentsThis paper focuses on use of ICT tools in chemistry education for effective teaching learning in Covid 19 pandemic situation.

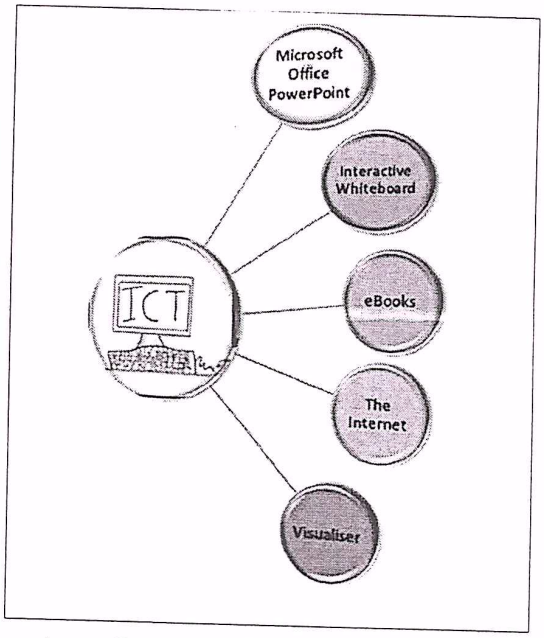
Keywords : Covid-19, ICT Tools,Online Teaching Learning

Introduction :

ICT (information and communication technology) is a powerful tool that affects every part of human life. It has brought the world together and altered the global economic, social, political, and educational landscape. Global growth and progress are heavily reliant on a trained workforce, which can only be obtained through high-quality education.. It has significantly altered the practise and methods in all aspects of business, society, governance, and education. It influenced teaching methods, learning methodologies, and scientific research, progressively transforming education from traditional to highbredIn the coronavirus pandemic ICT has proved to be beneficial in the education sector. Teachers and students, who are both pillars of education, are currently looking for digital

platforms to supplement classroom instruction that are relevant to their needs and already exist. Various ICTs are the most important factors of the efficacy of such instruments in education; the options are numerous, and each has its own set of benefits and drawbacks. ICT tools include computers, laptops, desktop computers, data projectors, software packages, printers, scanners, and Interactive teaching boxes etc these tools can be used for teaching and learning purpose .There are many topics in chemistry which can be taught and learnt with the help of ICT Tools.

ICT in Education :



According to Anthony (2012) the impact of ICT in education cannot be overemphasized, it is stimulating to note that -

1. ICT removes problems concerning space and time
   - The students can contact the teacher anywhere, anytime.
   - The student can collect and exchange information anywhere, anytime.
2. ICT gives access to knowledge
   - In principles, the students can draw on a global pool of knowledge
3. ICT makes serving and sharing knowledge easier.
   - The students can record the lecture, notes and presentation so that they can use it for preparing themselves for the examination.

According to bell and Margaret (2006), the following benefit emanate from the use of ICT education.

- Global access to knowledge
- Instant sharing of experience and best practice
- Self paced and self based learning.
- Learning becomes interactive and joyful through multimedia tools.
- Stimulations of experiential learning.
- Opening windows for new thinking, an atmosphere of innovation/ The use of ICT tools improves a student's topic learning. It fosters high-order cognitive skills while also developing digital literacy. ICT is one of the key factors that has helped in reducing the problems by using a variety of digital online activities and technologies. Online classrooms, such as Skype, Zoom, Google Hangouts, Google Classroom, and Google Meet, allow students to stay in touch with their teachers at all times. The teacher can deliver the lecture using a variety of E-learning tools, as well as conduct online assessments and attendance. Students can obtain thorough notes, information, and free books via numerous online

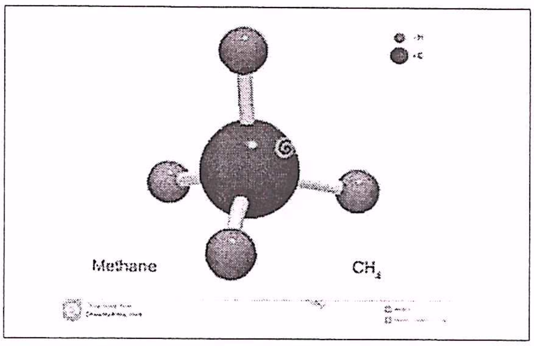
platforms such as ugcmoocs inflibnet.ac.in, epgp.inflibnet.ac.in, swayamprabha. gov.in, youtube.com, etc. There are numerous compelling reasons for every academician and researcher to build their own OERs (Open Educational Resources), which not only fulfil the educational needs of students but also serve as a vehicle for improving professional self-image. Dr. Ashwini Kumar Sharma (2020) mentioned"e-PG Pathshala or e-content containing modules on social science, arts, fine arts, natural and mathematical science, CEC-UGC YouTube channel, Vidwan-a database of experts who provide information to peers and prospective collaborators, National Digital Library (NDL), a repository of learning resources with single window facility.

ICT Tools in Chemistry

Various topics in chemistry can be learned using computational techniques and ICT. Using ICT tools, teachers and students can improve their knowledge. During the pandemic, ICT has taken the place of the chalk and talk approach. With the help of numerous softwares, we can teach and learn chemistry in a variety of themes. This paper covers subjects such as drug design, stereochemistry, International Union of Pure and Applied Chemistry (IUPAC) nomenclature system, chemical reactions, three-dimensional chemical structure and spectroscopy. Using ICT to teach a chemistry topic like this can assist the teacher overcome obstacles in the classroom. Chemistry has widened a teacher's views by focusing on information and communication technology tools and methods utilised in schools and universities. ICT is usually noted as a tool for more efficiently performing a task. There are so many topics which can be covered with the help of chemsketch. 1) Aromaticity (2). 3D structure optimization (3.) Tautomeric forms (4). Auto renumbering 5.) Calculation of Molar Refractivity, Surface tension, Parachor, Index of refraction, Density,

Polarizability and dielectric constant. (6.) IUPAC Nomenclature (7.) Import and export of molecule (8). Conversion of 2D into 3D (9) Advance form of periodic table (10). Structure of Carbohydrate (11). Structure of Fullerene and other bigger molecule (12.) Editing of molecule structure. It is important for both students and teachers to use ICT regularly in their courses (Figg, 2000 et al.).Students higher-order thinking skills are enhanced in learning environments where ICT is used (Allegra, Chifori, &Ottaviano, 2001 et al.).

Stereochemistry :

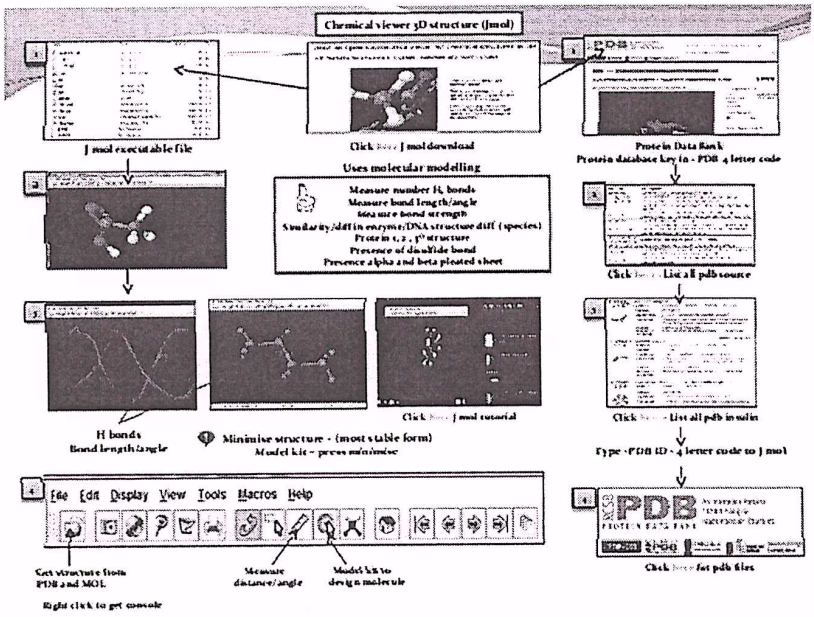


Stereochemistry is the study of chirality in compounds. It's also known as three-dimensional chemistry. It is extremely difficult for a teacher to teach 3D structures using the chalk and talk approach since creating 3D

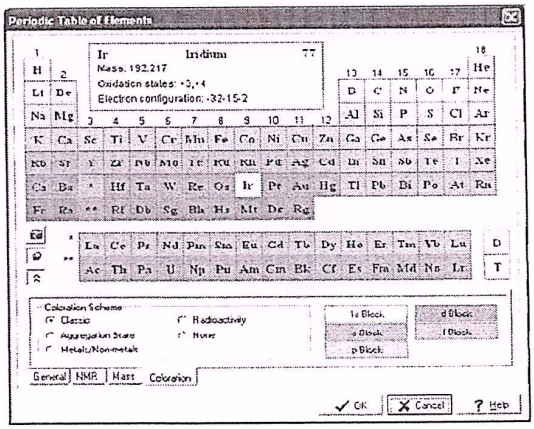
structures on a blackboard is not possible. There are various free sketching programmes available on the internet that may be used to draw 3D objects and determine information such as bond angle, angle strain, and chiral carbon.

of the periodic table, but with the help of ICT technologies, it may be taught in a systematic way.

The periodic table is laid out on a large grid. Because of its atomic structure, each element has a distinct position. The periodic table has



Spectroscopy : ICT Tools can be used to study IR, NMR, and Raman spectroscopy.



The knowledge of periodic table is required in organic, inorganic, physical, pharmaceutical, drug, and medicinal chemistry etc. It's difficult to memorise the properties rows and columns There are distinct qualities for each row and column. Magnesium (Mg) and calcium (Ca) are found in column two and have some similarities, but sodium (Na) and magnesium (Mg) are located in column three.

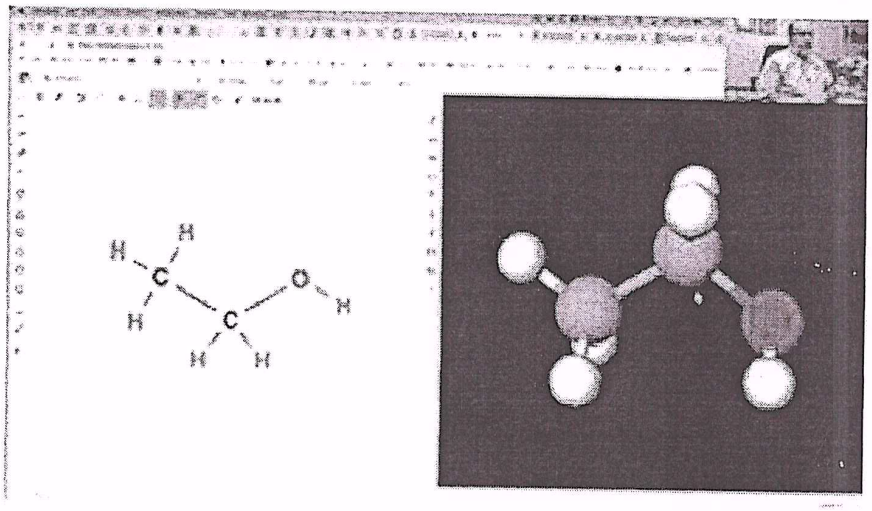
IUPAC Naming :

The IUPAC nomenclature of organic, inorganic, and polymer chemistry is a systematic technique of naming chemical compounds approved by the International Union of Pure and Applied Chemistry (IUPAC)

3D Structure :

The molecular formula for ethanol is C_2H_5OH, which is a simple example of a 3D Structural Formula. Compare and contrast the two representations of ethanol (C_2H_5OH)

below. When compared to the ("ball and stick") model of the 3D structure of ethyl alcohol, the sketched 3D structural formula of ethanol (on the left) may be comprehended even better (on the right).



There is a of chemistry software available that may be utilised as ICT tools to help students learn chemistry more effectively. Some of them are free to use, while others have monetary worth. Chemdraw software can be used to draw molecules. Along with the object, this tool provides a wealth of supplementary information. Software can also be used to study interactive reaction mechanisms.

e-resources :

There are various e-resources that benefit both the teacher and the learner by allowing them to update their knowledge by using them for quizzes, drawing models, and other activities. Below are some links which are useful to students.

Chemistry Resources: Simulations

https://www.edinformatics.com/HTML5//html5-chemistry-simulations.html
https://phet.colorado.edu/sims/html/build-an-atom/latest/build-an-atom_en.html
https://phet.colorado.edu/en/simulations/category/chemistry
https://www.edinformatics.com/interactive_molecules/
https://www.chemtube3d.com/
http://www.chemistry-drills.com/image_drill.php
https://phet.colorado.edu/en/simulation/molecule-shapes