Chapter 6

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It has been observed that the integral use of technology in the classroom changed the focus of student teacher interactions from a teacher led lecture format to one in which students spent more time working cooperatively in groups and teachers spent more time acting as facilitators. Computer animations are usually excellent tools for education. Modern computer aided learning encompasses integrated environments where conceptual demonstrations, model and animation tools, real time acquisition of data and assessment are being realized at several universities worldwide. Advanced measurements can be brought into the home via remote laboratories; animation can be created to show a variety of principles and reactions formation in chemistry and can also be tailored to fit the problems at hand. The current research work is intended to find; how computer animation techniques are being used to provide effective teaching methodology for chemistry; and also, the role of such tutoring systems that can provide new dimensions to teaching methods.

Visualization and animation tools have changed the nature of chemistry research and have the promise to transform chemistry
teaching methodology. Computer Animation went through so much change to get to where it is today. It still continues to change rapidly today. As new, faster hardware and more sophisticated software become available at continually dropping prices, new standards are appearing almost every month. Further insights from educators, computer scientists and developers, and graphic artists are important for chemistry educators who want to help students learn with animation tools. Animation, despite its flaws, has been proven itself truly useful in the field of education.

The role of animation in education revels some of the key benefits that are as follows:

- **Skill and Ability improvement** - The interactive environment of animation would help the students learn faster and without the complexities in traditional school lectures.

- **Interactivity** - In traditional school lectures, there is a low chance for a shy student to be able to participate in class discussions. If this were the case, the student may learn less from what she/he could in animation.

- **Engagement** - Animation, with all the things that make it interesting, would definitely hook its learner because of the stuff that makes it challenging and worthy of a person's time. Since a learner may go back again and again to that reaction, his/her daily performance is increased.
• Flexibility and safety - Animation provides a hazard-free environment, especially in chemistry experiments that one can redo without injury.

• Motivation - Since this type of education is fun, learners are motivated to learn more and more each day, thus increasing the skills they acquire.

• Eliminates Frustration - Learning through animation helps in the maturity of decision-making of the learner.

• Attracting and holding attention - It is said that colors attract attention. This standard is important in animation for a learner or student to be able to learn much, much better.

• Showing prototype designs - Animation is a dynamic tool that shows stepwise formation of chemical reaction that are usually not clear in text books.

• Creating models of data - Animation is easily manipulated by the user, therefore for them to become creative and artistic, three-dimensional models can be useful in broadening their imagination.

A huge gap has been observed between the activities of human tutors and those of computer tutors. Basically, for the case of providing the same support to students, human tutors provide more flexible and more subtle support than intelligent tutors. Given our society's increasing need for high quality teaching and training,
computer supported education is becoming critical to complementing human tutoring in a large variety of fields and settings. However, the general idea is that intelligent tutors retain some crucial aspects of the activities of human tutors. They have proven to be more effective than classroom teaching. Research in Intelligent Tutoring Systems leverages advances in Artificial Intelligent, Cognitive Science and Education to increase the ability of computer supported education to autonomously provide learners with effective educational experiences tailored to their specific needs, as good human tutors do. The work is intended to explore the history of Intelligent Tutoring Systems and discussion of their development in the context of Artificial Intelligence (AI) and chemistry education theory. It also revealed the silent goal of ITS along with transformation of learning environment being affected by ITS system.

Intelligent Tutoring Systems emerged from Artificial Intelligence at the very time that AI was struggling to transcend the goal of mimicking human intelligence by creating machines that could think like humans. ITSs are doomed to become a footnote in the history of both computer science and educational psychology. However, ITS goes beyond training simulations by answering user questions and providing individualized guidance. Unlike other computer based training technologies, ITS systems assess each
learner's actions within these interactive environments and develop a model of their knowledge, skills, and expertise. Based on the learner model, ITS tailor instructional strategies, in terms of both the content and style, and provide explanations, hints, examples, demonstrations, and practice problems as needed. ITSs began to move out of the AI laboratories into classrooms and other instructional settings, they began to attract critical reactions. ITS provides highly interactive learning environment. Working with traditional methods of teaching and learning, and using traditional means of evaluating outcomes, the developers of ITS have tried to show that ITS can significantly improve the speed and quality of students learning. And, to some extent, they have been successful.

An ITS can be used to enable the students work independently, to improve their understanding of concepts within related domain, and to take progress of problem solving ability for each of them. On the other hand, an ITS can be able to assist not only their student users but also the teachers in developing and managing courses. Intelligence involves mental capabilities such as the reasoning ability, planning, solving problems, thinking abstractly, comprehending ideas, and learning. Also, it is related to creativity, personality, or character of the person according to psychology. On the other hand, understanding the chemistry reaction is the nightmare for lots of students. The students doubt
their creativity, talent, and motivation when studying mechanism of chemical reactions. This is unavoidable. In this sense, the tutoring systems must have the capability of real teachers, and it must act as human tutor in a class. ITS can rise up the effectiveness of teaching chemistry in a class room. Following benefits of an ITS compared to standard commercial tools for computer assisted instruction has be remarkably observed:

- Content is distinct from strategies.
- Instructional content is modularized for reuse.
- Generic teaching strategies can be used with different content.
- Abstract knowledge structures can be used as the basis of presentation rather than making decisions at the content level.
- Tutor behavior can be easily modified a single change to the definition of a strategy can apply to the whole curriculum.
- Module reusability allows usage for several purposes e.g. a topic can be used for information, examples, summary and assessment.
- Student learning preferences and needs are more flexibly met.
- Definition and modification of instructional content is easier for the Instructor.