# Innovative Practices in Teaching and Learning

## Objectives:

Innovation is an essential component for success. Globalization and rapid technical changes in the education sector has created a need for change in teaching style which leads to continuous innovation. Teaching innovation is the process of creating new ideas, theories, methodologies and solutions that can be shared with the classroom. Innovation in four-year degree program ensures that it transforms the students into graduates, those who prepare themselves for employment in the engineering industry and update them according to rapid changing technology.

The use of innovative method in educational institutes has the potential not only to improve education, but also empower people and mobilize the effort to archive the skilled engineer for country.

## Innovative Practices Implemented at SSGMCE

Following innovative practices are initiated and implemented by the faculty for students to learn in a better manner

| S N | Innovative Practices | Context/Methodology | Impact/Outcome |
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| 1 | Moodle Access to Teacher and Students | Moodle is a learning platform provides teacher, and Student with a single robust, secure and integrated system to create personalized learning environments<br>Moodle server access is available to individual student and faculty.<br>Teachers posting notes, videos related to their subjects and individual students can access.<br>Teacher conducts online test and quizzes. | This Practice helps students to learn the concepts at their convenient time<br>This helps in sharing all the course files, video lessons, gate questions, text books and reference books online for all subjects of the semester<br>This helps to conduct online test, assignments and quizzes for teachers also make evaluation easily. |
| 2 | Content based question making | Questioning is an integral part of meaningful learning, Formulation of good questions is a creative art which improves creative and critical thinking skills in students. Students are asked to develop question banks based on the topic taught and faculty then helps the students to answer those questions. | This Practice enhance creative thinking skills, critical thinking skills and problem-solving skills in students |
| 3 | Multimedia | Multimedia is an inevitable part in teaching learning process. Various multimedia techniques used are presentations, videos, animations. | This Practice motivates the students for effective learning and to create their interest in learning process which leads to better knowledge retention. |
| 4 | Power point presentation | It provides the ability to equip the presentations with different types of media-including images, sounds, animations, and much more. It enhances the students' abilities to retain what they're being taught, especially those who are visual learners. | This Practice develops the comprehension of students and to learn effective way to use visual aids while working on their presentation and |
| 5 | Educational Videos | Application of videos allows students to get a real-life exposure of the scenario where the concepts they have learned is applied. | This Practice motivates the students for effective learning.<br>This Practice develops potential |

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| | | Videos facilitate the assimilation of contents, thus improving the efficiency of the learning process. Application of videos can demonstrate complex ideas in much easier and simplified way. | for deeper learning of the subject. |
| 6 | Animations | Concepts hard to visualize are taught using animations. Animations are used in the processes of designing, engineering calculations, visualization and monitoring technological processes and visualization of assembly processes. | This Practice creates the interest in students for gaining insight of complex engineering problems. |
| 7 | Simulated Software Based Learning | **Simulation** refers to the imitation of real-world activities and processes in a safe environment. Simulations provide an experience as close to the real thing as possible and has the advantage of allowing learners to reset the scenario and try alternative strategies and approaches. It allows students to develop experience of specific situations by applying their knowledge. Commercially available general packages such as MATLAB, SPICE, Multisim, XILINX, AUTOCAD, ANSYS LABVIEW etc. are used to simulate engineering problems. | This Practice provides students with exposure to real engineering instruments and devices.<br>This Practice develops skills and experience |
| 8 | E-based Learning | E-learning is a learning system based on formalized teaching but with the help of electronic resources. The links are provided to the students where they can do self-study and study the topic in depth and learn the contents beyond syllabus. Students are encouraged to visit NPTEL lectures, browse different internet sites to increase their knowledge about the subject. | This Practice allows students' greater access to education in comparison to traditional methods of teaching,<br>This Practice enables students to share information and data in a relatively easy way. |
| 9 | Role -Playing | Role-play is a technique that allows students to explore realistic situations by interacting with other students in a managed way in order to develop experience. It provides a platform to the students what they have learned and how they should correlate it with live situation. | This Practice develops critical thinking<br>This Practice gives better understanding of the complex topic.<br>This Practice encourages the students to enhance their cultural and diversity skills. |
| **10** | Brainstorming | Brainstorming is a useful tool to expand creative solutions to a problem. It can help define an issue, analyse a problem and possible solutions. It is a great way to allow students to voice their opinions or ideas on a particular topic. | This Practice motivates, stimulates, and promotes student interaction.<br>This Practice develops students creative and critical thinking skills. |
| 11 | Project Based Learning (PBL) | PBL starts with a problem and requires the students to analyze and apply information and theory learnt, to solve it. Students work in a group to solve or managed the assigned work. In this regard real time projects are given to students and guided by faculty and industry person. Faculty members visit industries and update themselves to support students. Faculty members visiting the Factory/Industry explore basic details about the organization, Products manufacture | This Practice enables them to acquire skills like collaboration, communication and independent learning, and to prepare them for lifelong learning. |

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| | | /services provided, Certifications. Faculty identify possibility of campus recruitment, expert nomination for technical events and other suitable Industry-Institute tie-up activities. | |
| 12 | Field Survey/Case studies | Case studies help to increase students' Case study is found to be beneficial for students in terms of actively engaging them and allowing them to learn the applications of engineering techniques to solve real world problems. Thus, use of case studies is a pedagogical technique that allows students to apply their theoretical knowledge to practical situations. | This Practice enhances students' critical thinking and problem-solving skills and motivate them towards learning attitude. |
| 13 | Industrial visit/field work and report writing | Industry visit/ field work means sending the students to certain workplaces sites, garages, Industries for doing some Practical work. Industrial visit is considered as one of the tactical methods of teaching. Students get the practical experience in the organization. They get aware about the recent technologies used by industries. | This enhances communication and writing skills in students<br>This enables students to understand professional duties and responsibilities of the personnel in the field. |
| 14 | Designing Tutorials | Tutorial is an important teaching-learning tool. It helps learners enhance their intellectual, communication and social skills. Tutorials provide an interactive learning environment where students can clarify and extend, through readings, discussions and other activities, what they learn from the lectures. Tutorial is given to the students based on the topics covered in theory lecture | This Practice enhances students, intellectual, communication skills. |
| 15 | Designing Quizzes | Quizzes helps to expand students' knowledge and helps to explore new sills. Quizzes are designed in such a manner that to solve that, it requires critical thinking and extensive research. Quiz is based on complete course and quiz scores are calculated based on the number of points assigned to each quiz question. Quiz in the form of MCQ are also assigned to students. MCQs are found to be flexible to various levels of learning outcomes from simple recall of content to more complex level such as students' ability to examine facts, understanding concepts and principles. MCQs are designed to test quickly and effectively students' knowledge about a particular idea or concept | This Practice enhances critical thinking skills and improve subject knowledge. |
| 16 | Group Discussion | Group discussion on study topics plays a vital role in understanding the topic. Discussing the topic among classmates helps in learning a topic with perfection. It enhances the subject knowledge. It helps in exploring more ideas about the topic. It helps students to realize their mistakes and weakness. It builds self-confidence and improves communication skills. | This Practice develops skills in interpersonal communication and in expressing views in a clear and concise manner |

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| 17 | New Experiment development and testing | Main objective of this teaching learning tool is that it helps the students to acquire practical knowledge and increases the utilization of departmental facilities (Software, Interfacing /Computing /Laboratory Equipments). It helps to develop logical skills and technical manuscript writing skills in students. Students design new experiment which is not included in their experimental list. They identify the experiment, develop outline of experiment (Circuit Diagram, flowchart, algorithm, etc), perform the experiment and then analyze the results | This practice inculcates self-thinking and encouragement to develop their own experiments related to their topic of study |
| 18 | Mini/Term/Short Projects (Design/Fabrication / Simulation/ Software/ Hardware Development) | It helps students to gain expertise in their subject, students collect and extract the information related with the topic from different online and offline sources. Students demonstrate their presentations skills by presenting the information. They learn to communicate effectively and express their ideas and opinion about the project work. Students form a group of 2 or 3 and based on their interest select a mini project either hardware or software based. They access information through various resources and summarize the main idea. | This Practice expands technical knowledge through development in terms of software solutions and hardware implementation for industrial/societal problems |
| 19 | Think Pair and share | Think-pair-share (TPS) is a collaborative learning strategy where students work together to solve a problem or answer a question about a given topic. This strategy requires students to think individually about a topic or answer to a question; and share ideas with classmates. Faculty asks a specific question about the topic. Students "think" about what they know or have learned about the topic. Each student is paired with another student or a small group. Students share their thinking with their partners. | This Practice enhances thinking skills and communication skills in students |

The success of these practices results qualitatively as well as quantitatively. The qualitative factor improves student's curiosity and desire to learn. Also it changes student's perspective towards life. The quantitative factor improves academic performance and participation in co- curricular activities. Also Alumni of SSGMCE doing very well in corporate world.