Fortification Predictable Innovating Teaching for Academic Class Room Teaching

Dr. Y. Harold Robinson,
Department of Computer Science and Engineering,
SCAD College of Engineering and Technology, India
yhrobinphd@gmail.com

Mrs. E. Golden Julie,
Department of Computer Science and Engineering,
Regional Centre, Anna University, Tirunelveli
juliegolden18@gmail.com

Abstract—The Fortification Predictable Innovating teaching is not only one sort of new teaching idea for the key problem in the transformation of current course education, but one kind of teaching model of the latest innovation as well, which takes rapid mastery the basic understanding of knowledge as a foundation, the innovation ability fostering as a core, and the quality characterizes the goal. From the aspects such as classroom teaching, practice teaching and innovation practice, this model pays more attention to nurture an undergraduate's innovative ability. With a long practice in university the authors work with, this model can be regarded as a good reference for making teaching program, and for the transformation of teaching content and mode.

Keywords—*Prototype teaching model, teaching idea, classroom teaching, innovation practice.*

I. INTRODUCTION

Improving the quality of teaching is the strategic focus on higher education leaping development. Facing the development trend of popularization of higher education, traditional teaching methods can no longer meet community needs of complex high-quality talent in the 21st century. Because of that, it is very important and urgent to find a way that how to optimize the educational models and teaching methods, stimulate student innovation awareness, and improve innovative ability. The current patterns of undergraduate teaching include "Constructive Teaching Model", "Case Teaching Model", "Heuristic teaching and research-based learning" and so on. These models improve teaching methods in a certain extent. However, the 21st century is a rapid development of science and technology, the world's economic boom period. Students should first be integrated into the classroom as soon as possible, grasp the basic knowledge, on this basis, in order to be innovative. The prototype teaching in this paper, the idea of which is teach for innovation, involves in both teaching process and learning process [1]. This model takes the knowledge as a foundation, takes the innovation ability as the core, and takes the quality internalizes as the goal. The characteristic is "Getting Started Fast" that helps students to master the basic knowledge as soon as possible and accumulate knowledge, then puts forward their views to explore a deeper level of knowledge, which can improve their ability to innovate effectively [3]. In continuous support of the Provincial Department of Education and the State Education Fund, the computer teaching reform group in which we locate has gotten bold exploration and practice for the proposed method [2]. The practice has proved that this method has played an active role in teaching computer courses in the past two years. Progress pedagogy is the technique to improve education and knowledge recital. Dissimilar inventive education methodologies are at the present in employ crossways the world. Hybrid education comprises e-learning over and above the confronting each other education. The creation of latest technologies and visual multimedia methods like elegant appliances for dissimilar assignments similar to education, inventing innovative question papers, evaluation of scholar and student, criticism and research attitudes [9]. Inventive techniques assist in conveying a modification and for the most part of the period for the enhanced way. It facilitates the learners study quicker and in an well-organized, attractive and an interactive mode and it is the teacher's accountability to abscond the conventional techniques and build approach for original and superior schemes for the apprentices assistance [10].

II. THE GENERATING OF PROTOTYPE TEACHING IDEA

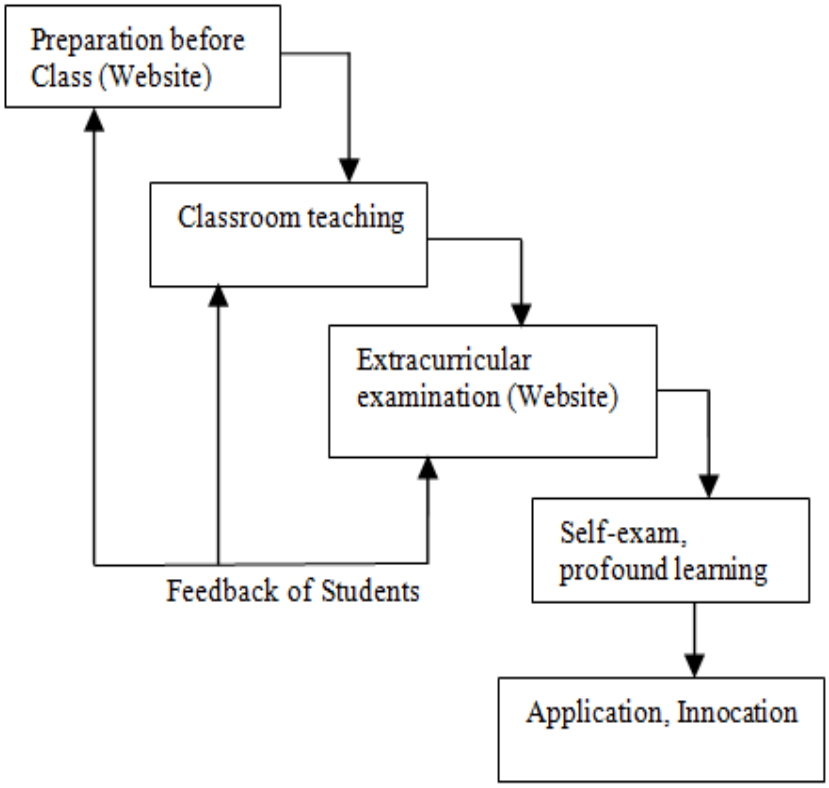

Figure. 1 Prototype Teaching Model

Teaching ideas of the prototype model get root in the rapid prototype model in software engineering. The idea is to: for a project, firstly, give the initial model of the project, and modify based on the prototype according to the views of users. Then repeat to improve the prototype for perfecting gradually the prototype to meet the needs of users. Knowledge by nature is to build, the goal of prototype teaching model, as shown in Figure. 1, is to format intra-individual knowledge structure quickly and efficiently.

Under the prototyping, the entire teaching process is divided into classroom teaching and extra-curricular learning websites. Through extra-curricular learning websites, knowledge points, key points and difficulties of each chapter are provided to students (similar to the prototype of content what they learn), which make student prepare a lesson before class [4]. Then the classroom teachers adopt new thinking methods in classroom teaching, systematic, scientific, targeted teaching of various knowledge points to make students get hold of the main knowledge in a relatively short period of time on the course as soon as possible [5]. In this way, students will be able to go from the easy to the difficult and complicated and step-by-step to master the knowledge of this course. There is a certain amount of knowledge on the basis, students can further explore in-depth knowledge, and then ask questions, analyze problems, solve problems, mining our own innovative potential to improve their comprehensive ability. My school practice shows that the model solves the problem students with poor basis who do not understand courses [6]. At the same time extra-curricular learning website solves the problem of good basis students who need more.

III. The Application of Prototype Teaching Model

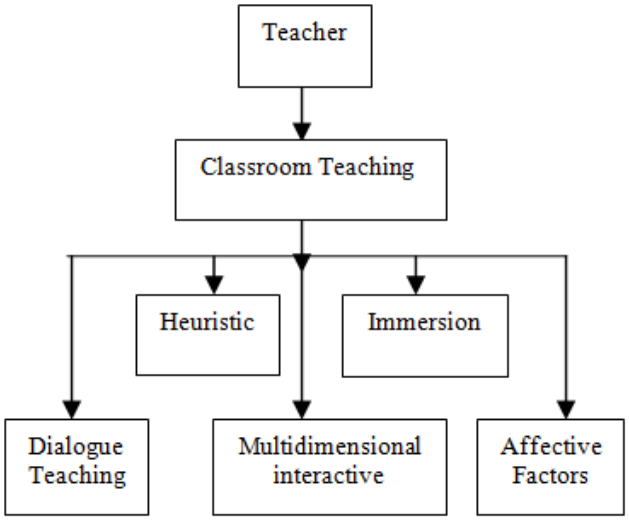

Figure. 2 Classroom teaching model

The key of undergraduate teaching is to mine the feature of courses. This paper takes an example from object-oriented course to show a concrete realization of the undergraduate teaching in the prototype model [7]. Object oriented course is a strong engineering application one, which is important for students to culture comprehensive programming capabilities. The current status of object oriented course is: as students there are some differences between individuals, some of the students have a good foundation, who reflect fast and master the content of teacher's taught quick. These students feel the teacher teaching slowly and hope to learn some in-depth content; some of the ones are just the opposite, which hamper the study of the follow-up courses in some extent. Therefore how to meet the learning needs of students at different levels is the inevitable trend of college computer teaching reform.

Prototype model shifts the past teaching mode by imparting knowledge as the core to the new one focusing on talent quality and capacity-building. The whole process of teaching divides in two parts: classroom teaching and extra-curricular teaching.

Through heuristics, multi-dimensional interactive, immersion style teaching methods classroom teaching helps students obtain the latest knowledge and forward trends of professional. After finishing a chapter, we can detect it through extracurricular teaching and find problems of students in time, and in accordance with the case of students re-appropriate changes in classroom teaching, which is easy to explain the next chapter. Through classroom teaching (as shown in Figure. 2) – extracurricular teaching (as shown in Figure. 3) - test results feedback - adjustment classroom teaching - extra-curricular teaching - test results feedback loop modes to teach, the method is adapt to the physical and mental development law to students. At the same time, this curricular teaching and extracurricular teaching in organic combination, which is not only to maintain the systematic of knowledge, but also can deliver the current technical knowledge of the latest technology trends to the students, so that the original "death" textbook turns into a "live" teaching resource library. There are three aspects to explore the teaching method [8].

A. The Reformation of Classroom Teaching and Enhancement of Students' Comprehensive Ability and Quality

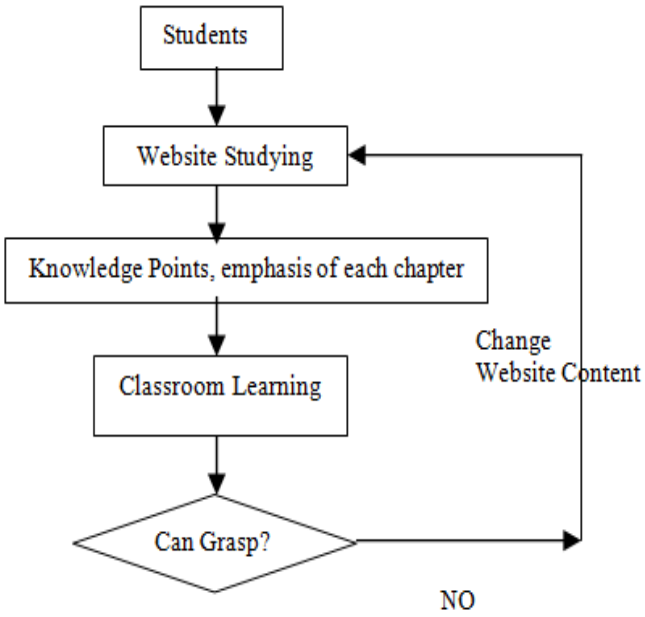

Figure. 3 Extra-curricular learning

For many students, programming course not the same as other courses is a new thing. So how to entry as soon as possible is the basis for teaching effect. Only blending into their curriculum quickly can learn the essence, find something and innovate, and then improve their overall ability and quality.

In the whole teaching process, first, we build the cognitive structure of the students. The so-called cognitive structure [4] is the learner's knowledge structure of the mind. The purpose of learning finally is to form a comprehensive network structure through the repeated assimilation of old and new knowledge. The more perfect the structure, the more compacted internal strength of students, problem-solving abilities are also stronger.

Second, determine the learning objectives of this course. For different students there are differences between individuals, therefore it cannot set the same goal for all students and the cultivation ability should be a ladder-type. It should allow different levels students according to their own situations to have a goal and have something in mind; we set three levels for this course: the first layer (the basic objective): can read simple program code and imitate the example of books to solve some problems; master the basic program design ideas. Achieving this goal can eliminate mystery and fear of students to design a computer program and establish self-confidence. The second layer (improving layer): can use object-oriented programming ideas to solve some of the more complex issues. This level can train students to analyze and solve problem. The third layer (high level): students must have some skills to solve complex problems and collaborate with others to develop a small system. Students at this level can develop innovation and the spirit of cooperation with others and lay a solid foundation into the society for future.

Finally, use scientific teaching methods according to the student's cognitive law. In the teaching process, firstly we show a complete program to students, which eliminate the program mystery to have students the concept of a program in mind, and enhance the perceptions of students. Introduction for students gets to be positive. Secondly, in the teaching adopt the "Step by step, orderly progress" principle. Selecting too much no related examples will make students spend a lot of time on the subject. In the teaching process we have used only one example. With the deepening of the content, examples also gradually become bigger and complex. In so doing, to enable students to understand complex issues is based on the simple questions, thereby eliminating mentality of fearing the complex issues; On the other hand, according to the steps that ask a question -- analysis problem -- solve problem, first, the

issue gets by the engineering practice(That leads to introduce the concepts and methods), And then use the related knowledge to expand and prove their concepts and methods, finally settle in the application (That shows how to use such a concept and methods to solve the practical problem). It makes students visible, tangible and catching up with the ideas, training and developing the student's comprehensive ability to solve problems. Third, strengthen dialogue, highlight enlightenment, emphasize interactive. Teaching is not just a knowledge transfer process, it is also an equal spirit communication between people to get life experience and life wisdom. Through dialogue, teaching activities are no longer simply process to master knowledge, but rather self-sufficient to show the students the individual, subjectivity to the process of comprehensive development. Interactive teaching is a dialogue, in-depth development. This interactive is not between teachers and students, but teachers - students -between students (Figure. 4). In a specific teaching process through questions, discussion, group games and other forms to interact with students, it makes students in the "interaction" access to knowledge to help students learn to think, be good at thinking, understand initiatively and master the knowledge, develop analytical and solving problem skills. In the "interactive" students can stimulate curiosity to learn. Only curiosity about things can think and ask questions in order to stimulate students' inquisitiveness. Increasing for knowledge increases, they can continue to promote the accumulation of knowledge, increase experience, and raise interest, thus contributing to its further exploration, so that the range of knowledge broaden and the likelihood of success will be greater. Finally, for the different sections, adjust the teaching methods by the test result of these extracurricular learning. The character of the computer course is to update faster, therefore, it should also timely impart students to the current forefront developments knowledge in the field. This will not only enable students to understand the development of the international situation and broaden the knowledge, but also inspire students to study in related fields, which ensure that students can better understand and grasp the teaching contents, not have the psychological fear.

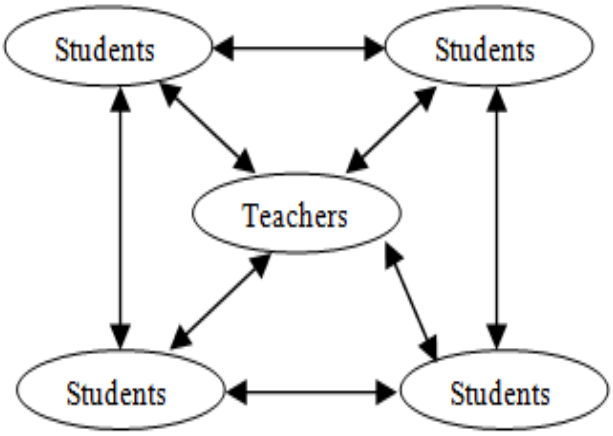

Figure. 4 Interactive model

B. The Integration of Information Technology and Courses, "Immersion" in Teaching

Swiss educator Pestalozzi advocated that feeling and impression which students learn from the classroom should be transformed into the concept of the students themselves that can be shown. In other words, it means that students learning not only use their own brain to think about, but use their eyes to see, ear to listen, hands to do, that is through personal experiences and spiritual insights to master what they have learned. How to make the students to lay down their burdens and easy to learn, we propose to give full play to the advantages of information technology, and integrate reasonably with information technology and courses, use immersion method cleverly. Immersion education from St. Lambert, Canada's bilingual education experiment, as "immersion education" is a teaching method in line with the law of physical and mental development of students. By strengthening this approach, the dominant way of teacher's "dip" to play students "into" the principal role as a starting point stimulates learning motivation of students to enable them to dedicate themselves to study, so as to achieve that students can understand, digest and absorb.

The main methods which we use in the teaching process are:

1) The Reformation of Multi-Media Teaching

The traditional multi-media teaching is the "multi-media + teaching" in a simple application, only displaying with a computer the original content which are written on the blackboard. This has little effect on improving the quality of teaching. In order to improve teaching standards, create learning environment, and well increase interest in learning to make teaching and learning process more colorful, we use "educational philosophy + technology facilities + information literacy," a multimedia teaching mode. Educational philosophy is the core idea of multi-media teaching, new technology facility is a powerful tool for improving teaching effectiveness and improving the information literacy of teacher is the protection of teaching quality. Multimedia teaching courseware production is the core that is how the advanced educational philosophy to be blended into the production of courseware. We believe that the production of courseware is not simply to copy, but refine and sublime the content of textbooks. In the production of courseware, firstly I summarize the basic concepts and basic methods of teaching logically from the point lecture. Secondly, in the modern age, the total amount of knowledge increases sharply and quickly with the explosive growth. If all knowledge has to be moved on courseware, it is outdated. Based on deliberating repeatedly teaching materials from syllabus, we refine and sum the focus and difficult content of each chapter as far as possible, "fewer but better, erudite and proficient". Thirdly, strengthen interesting. Courseware in the production process should make a dry content interesting as far as possible, and teaching in the course should always pay attention to regulating and moving the active classroom atmosphere. Because it is impossible to make the students maintain a high degree of concentration in the whole process of teaching and always, grasping the rhythm of classes and regulating the climate of the class can ensure that students maintain a high degree of energy concentration when teachers talk about the most important and exciting content.

2) The Fully Utilization of Network Resources, the Expanding of the Students Creative Thinking

Computer network contains the feature setting text, graphics, animation, sound together. This form can significantly swap people's thinking activities, promote the effective integration of a variety of thinking activities, and improve the ability of thinking in learning and creating. At the same time it promotes greatly the communication between teachers and students on network teaching platform that provides courseware, online discussion, item bank, online exam, forums, etc. And it’s also the platform that students consolidate existing knowledge and explore in-depth knowledge. I arrange comprehensive homework on "object oriented course, for which students collect information through the internet and organize and devise by their thinking. It not only enables students to give full play to their imagination and inspire creativity, but also deepens the knowledge in the planning and design process and arouses students' innovative potential and creative thinking.

3) Theory with Practice, Co-Operation Concept Cultivation

Learning is not only a process of receiving knowledge, but also a process of self-exploration, cooperation, interaction and participation, as well as to improve practical ability. The modern teaching views think that learning should focus on its practicality, give full attention to practical activities for students’ innovative and creative abilities. According to the main characteristic that the computer course get comprehensive and practicability unity, we use science teaching activities, that is, emotion - theory - practice, in the teaching process through mission-driven method, theory with practice to improve student manipulative ability, and instill in cooperation, the modern teaching philosophy. For example, after finishing explaining encapsulation, inheritance and polymorphism, the topic of work is "Computer Science Library Management System", combining theory and practice. Students are divided into several groups, and each group conducts appraisals after completing its mission. Aggressive shows a feature of the young students. In order to stand out, students will no longer remain at the level of understand, but give full play "into" the main role in the initiative to thoroughly digest and absorb what they have learned, on this basis to complete the task. This practice, on the one hand, consolidates what they have learned and improves communication with others, cooperation and interaction skills, on the other hand, it is such a way that penetrates the content of practice in the theoretical teaching, theoretical knowledge in practice, so that encourage students to truly understand what they learn to use, enhance the students learning enthusiasm and inspire the students learning potential. That is to lay the foundation to foster the innovation and high quality compound talents for the future, paving the way to smoothly enter the society.

C. To Use Emotional Factors Rationally, and Reflect the Flexibility of Teaching

Education and teaching process is not only the teaching mode of imparting knowledge and answering questions, but also the process of the exchange of teachers and students emotional, spiritual impact, even the process of education love to students. Rogers, an American humanistic psychologist, believes that people's awareness activities are always accompanied by a certain amount of emotional factors; a German educator Diesterweg said: "The art of education is not to impart knowledge and skills, but to inspire, awaken and stimulate." Flexible management produces a potential driving force in human heart, making organization become a people's conscious action and stimulating the inherent potential, initiative and creativity of the individual in deep inside. In our opinion, emotion is the lubricant and catalyst of the teaching. Correctly guide and the clever use of emotional factors can effectively improve students to interest in learning, and also improve teaching effectiveness. Many examples show that if a student's performance is good, learning will have a sense of accomplishment. If a teacher praises him, and he is more confident, learning is even more quickly. On the other hand, if a student's performance is bad and teachers do not pay attention and do criticism, he will lose confidence, and be down in spirits, which in turn affect the ability to play, thereby creating a vicious circle, leading to learn plummet. Markov, an educator of the Soviet Union has clearly pointed in "Education and Development": "We should inspire the idea to explore independently to students, and this idea is linked with the living mood organically. A good mood makes students in high spirits; otherwise it will suppress their intellectual activities." Confucius once said: "he who knows the truth is not equal to him who loves it, and he who loves it is not equal to him who delights in it." In addition, the fact shows that there are individual differences and personality differences among students, which can reach the limit also different. Some students like to express themselves, always allowing themselves to active participation to continuously improve the learning ability. But there are also a small part of the students with the poor basis or be introverted, leading to inferiority and not daring to express their points. Because of those, teachers should develop different requirements according to each person's situation, constantly giving positive encouragement, positive evaluation, appreciation education, and also being good at discovering the advantages of students, encouraging students to boldly display themselves and experience the joy of success, as long as that can play their limits what they can, instead of following the same pattern that asks everyone to reach the same goal. The digital upheaval is converting our occupation, our administrations and our habits. It is converting the technique students and youthful persons engage in recreation, right of entry in sequence, correspond through every erstwhile and discover. But, to this point, this uprising has not distorted generally schools or for the most part education and wisdom progression in classrooms.

The Networked Teacher can have the following innovations

i. Curriculum Documents
ii. Colleagues
iii. Popular Media
iv. Print and Digital Resources
v. Family
vi. Local Community
vii. Blogs
viii. Wikis
ix. Video Conferences
x. Chat
xi. Social Networking Services
xii. Digital Forum
xiii. Online Communities
xiv. Social Bookmarking
xv. Digital Photo Sharing
xvi. Tool Development
xvii. Content Development

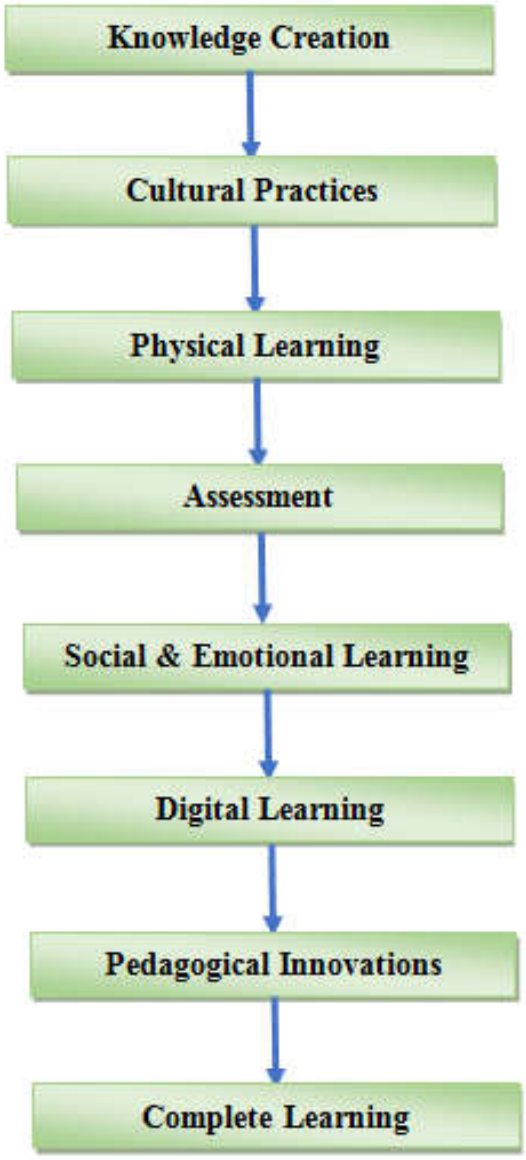

Figure.5 illustrates the Learning Model for Classroom teaching.

Teaching Options can have the following options

i. Motivator Posters
ii. Edit Images from Cameras
iii. Image Buttons
iv. Projects
v. Image Creators
vi. Social Media in Classrooms
vii. Webinars
viii. Android Whatsapp
ix. Discussion Board
x. Chat rooms
xi. Emails

IV. CONCLUSION

Teaching model reform is a long and complex process, the inevitable requirement to enhance the overall quality and ability to innovate of the students. The prototype-teaching model in this paper is a bold attempt for the new teaching demands, advancing with the times of the teaching mode. Practice shows that the platform structured by the model pays importance to independence and atmosphere to effectively improve the quality of classroom teaching and learning effect, promoting students full freedom of individual development.

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Dr. Y. Harold Robinson is currently working as an Associate Professor, dept of CSE in SCAD College of engineering and Technology, Tirunelveli. He finished PhD in Anna University, Chennai in 2016. He finished ME degree in Anna University, chennai. His research interests are Wireless networks Mobile Computing, Wireless Sensor Networks. He has published several Research papers in International Journals. He has presented many papers in National and International conferences in Network security, Mobile Computing and Cloud Computing.

E.Golden Julie received her B.E degree in Computer Science and Engg in 2005 from Anna University Chennai and ME degree in Computer Science and Engineering in 2008 from Anna University Chennai. Currently she is Pursuing her Ph.D from Anna University Chennai. Presently she is working as assistant professor in Regional centre Anna university, Tirunelveli, India She has published many research papers in various fields. Her research area includes Wireless Sensor Adhoc Networks and Image Processing. She is a member of ISTE.