

E-Learning R&D projects initiated during Xth and XIth Plan period

Project Title	Design and Development of an online course contents on “Cyber Security” to be offered in E-learning mode
Executive Agency:	C-DAC, Hyderabad
Principal Investigator:	Dr. N. Sarat Chandra Babu Centre Head
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URL:	http://www.cdacindia.com http://www.elearn.cdac.in/cccs_free_course/index.htm
Project Objectives:	Design & Dev of “Cyber Security” course content, course delivery methodology, creation of question bank in e-learning mode confirming to e-learning standards.
Achievements/ Outcome	The course on Cyber Security is being offered through e-learning mode using e-Sikshak Framework. The course can be accessed through http://www.elearn.cdac.in (e-Learning portal). A Data center for hosting Learning Management System (e-Sikshak) and course content is being set up at C-DAC, Hyderabad premises. Course structure includes the following Titles <ul style="list-style-type: none"> • Security Concepts and Mechanisms • Security Management • Network security • System and Application security
Start Date	16/10/2003
Duration (in months):	18
Status of Project:	Project completed on 31/03/2005

Project Title	Enhancing Competency of IT teachers & Industry Professionals
Executive Agency:	K. Re. SIT, IIT, Mumbai
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Project Objectives:	To enhance quality of services in the remote / VSAT reception to enhance competency of IT Teachers & Industry Professionals
Achievements/ Outcome	The Distance Education programme (DEP) has so far conducted 43 semester long courses, 14 short term courses and numerous guest lectures which have benefited over 6000 participants. The project implementation has led to the following: <ul style="list-style-type: none"> ▪ Improvement in the quality of visuals (sharpness, contrast, resolution) as well as quality of sound (audio) received has been confirmed by reports from and visits to the various remote centers. ▪ This has greatly contributed to the acceptability of programs both the live transmission as well as recorded version rebroadcast for students on demand. ▪ Currently, 09 organizations have requested to avail of this facility which include Engineering Colleges as well as IT Industries. ▪ All India Institute of Speech and Hearing at Mysore under the Ministry of Health and Family Welfare has requested the Project Investigator to recommend the details of a similar set up for their use since there is shortage of trained teachers in this area. ▪ Many similar organizations which have limited supply of experts, can now make available their knowledge to their geographically dispersed regional centers.
Start Date	01/12/2003
Duration (in months):	27
Status of Project:	Project completed on 31/03/2006

Project Title	Development of content delivery tools to enhance the existing experimental education technology services.
Executive Agency:	IIT , Kanpur
Principal Investigator:	Dr. Yatindra Nath Singh
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Project Objectives:	To augment an existing IT based education support system based on existing web tech to a much better and manageable system
Achievements/ Outcome	<ul style="list-style-type: none"> ▪ Developed an open source free Learning Management System (LMS) named as Brihaspati. ▪ The project has been registered with sourceforge.net for using their high-speed server for distribution of code worldwide. Also registered with freshmeat.net and eduforge.org to give better visibility. ▪ For more awareness, IIT, Kanpur conducted workshops/ training programmes. 72 Institutes/ organizations either have shown interest or have been using this software. Total download from sourceforge.net is 2288. During the semester approx. 4500 (students and instructors) users were expected to use one single installation for about 350 course accounts. Total downloads till completion of project was 1977. ▪ Based on the feedback received from its users many modifications have been done in the software in order to improve the performance
Start Date	22/10/2003
Duration (in months):	36
Status of Project:	Project completed on 21/10/2006

Project Title	Courseware creation for Quality Teaching of IT local Instructors using Interactive multimedia in Vernacular Languages (Bengali, Hindi, English)
Executive Agency:	C-DAC , Kolkata
Principal Investigator:	Shri A.B. Saha,
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Project Objectives:	To boost the quality of existing class room teaching/training in major cities (Non –Metro) in IT with interactive multimedia based courseware in Vernacular Languages (Bengali, Hindi & English)
Achievements/ Outcome	<ul style="list-style-type: none"> • A group of youths of Nalhati district, Birbhum, W.B. is being trained by series of courseware developed under the scope of the project. This include training through two CAD centers on ‘Auto Tex’, ‘PC maintenance and PC assembly’ • Berhampur Cooperative Society has been imparting IT training to the local silk weavers in Murshidabad district (W.B.) using interactive multimedia based content developed • Six day training on IT awareness has been conducted to about 432 artisans of Birbhum district, W.B.
Start Date	01/04/2004
Duration (in months):	6
Status of Project:	Project completed on 30/09/2004

Project Title	Training of Trainers in E-learning
Executive Agency:	DOEACC (Aurangabad & Kolkata)
Principal Investigator:	Executive Director
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Project Objectives:	To introduce fundamentals of E-learning , H/w and S/w and train teachers for implementing e-learning for the better educational methodologies.
Achievements/ Outcome	<ul style="list-style-type: none"> ▪ 240 teachers trained (120 from each centre) in use of e-learning in education ▪ Trained teachers will be able to locate and use/ reuse the course contents and create their own content in e-learning in their area of specialization and they will act as master trainer for their parent Institute. ▪ Create multiplier effect to use ICT technologies and create awareness about the usage of information tools, blending it with traditional skills to enhance quality and productivity in education
Start Date Duration (in months):	04/03/2004 24
Status of Project:	Project completed on 31/03/2006

Project Title	Data Compression Techniques and its Application to E-Learning/ Education
Executive Agency:	IIT, Kanpur
Principal Investigator:	Dr. Prem Kalra
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Project Objectives:	To develop of a group of data compression techniques that can be applied to images, scanned documents and videos; and hence creating a system that adapts itself to the quality of services (QoS) offered by the Internet (Network) connection instead of expecting a specific QoS on the Network.
Achievements/ Outcome	A group of data compression techniques applicable to images, scanned documents and videos have been designed and developed in two different modules. These two modules have been uploaded on IIT, Kanpur Web space as well as CDAC, hyderabad Web space for free downloading
Start Date Duration (in months):	01/04/2006 19
Status of Project:	Project completed on 31/10/2007

Project Title	Development of Interactive Learning material on Introduction to Animation and Multimedia
Executive Agency:	DOEACC Centre, Kolkata
Principal Investigator:	Sh. Arup Chattopadhyay
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Project Objectives:	To develop interactive digital multimedia content on “Introduction to Animation and Multimedia” in response to the rapidly growing demand for utilization of self-paced learning material on animation and multimedia.
Achievements/ Outcome	<ul style="list-style-type: none"> ▪ Interactive digital multimedia content on “Introduction to Animation and Multimedia” has been developed ▪ The content created out of the project is being used in the career oriented training programme on “Certificate course in Digital media creation” for candidate from North Eastern region being organized at DOEACC, Kolkata, whereby 120 candidates would be directly benefited from the content developed
Start Date Duration (in months):	27/01/2006 26
Status of Project:	Project completed on 31/03/2008

Project Title	Content-Based Streaming and Real-Time Regional Language Captioning of E-Learning Video Data
Executive Agency:	Indian Institute of Technology, Roorkee
Principal Investigator:	Dr. Ankush Mittal/ Prof Manoj Mishra
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Project Objectives:	<ul style="list-style-type: none"> • To develop new standards and algorithms for e-learning adaptive streaming applications that can optimize the bandwidth utilization. For this, a real-time system is proposed for dynamically changes the resources allocation within a live video streaming session. • A Regional language captioning is proposed for complementing the end user’s comprehension of the lectures delivered in English. The product will have to be deployed and tested through ERNET in few Navodaya/ Central schools. • A standard Media Markup language needs to be designed to apply the principles of the Web to multimedia, creating continuous Media Web
Achievements/ Outcome	Two Software Systems have been developed. The first is for video streaming over the network for the purpose of E-Learning and second is for regional language captioning. Eight papers pertaining to the project were published in the International Journal/ presented in International conferences. Project outcomes are available at CDAC, Hyderabad website for open use
Start Date Duration (in months):	15/03/2006 23
Status of Project:	Project completed on 15/02/2008

Project Title	Development of a Quality Assurance Framework, Quality metrics, and prototype tool for evaluation and comparison of e-learning applications and training the teachers in e-Learning
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Project Objectives:	<ul style="list-style-type: none"> • Develop a framework for formal quality assurance of e-Learning content • Develop quality metrics that can be used for quantifying the various quality parameters of a e-learning tool and the content • Develop a prototype tool that can be used by end users/developers for deriving the quality metrics so that the effectiveness of a tool can be measured and also different tools can be compared • Training of teachers in e-Learning through a training programs on e-Learning tools, content development and standards; Using tools with local language support and also on quality assurance framework developed as part of the above objective (1 month duration/ contact period: 1 week) .
Achievements/ Outcome	Quality Analytic Framework prototype tool has been developed which can evaluate usability, accessibility, content conformance to SCORM 2004, scalability, security and generate appropriate reports. CDAC, hyderabad has trained more than 450 teachers on e-learning. The tool has been developed using web service technology to facilitate deployment of testing modules on different nodes with controlling unit at central location
Start Date Duration (in months):	27/03/2006 36
Status of Project:	Project completed on 26/03/2009

Project Title	National Competitiveness in Knowledge Economy
Executive Agency:	IIT, Roorkee
Name of the organizations jointly participating in the project:	IIT, Chennai National Productivity Council (NPC), New Delhi International Management Institute (IMI), New Delhi
Principal Investigator:	Prof. V.K. Nangia
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Project Objectives:	<p>A/ Mapping the directions of transition from industrial economy to knowledge economy</p> <p>B/ Developing strategies of change management for transformation from industrial age to information age</p> <p>C/ Identifying new knowledge streams/disciplines likely to emerge in the evolving knowledge economy and suggesting specialized courses to help meet manpower requirements of the knowledge economy etc etc</p>
Achievements/ Outcome	<p>The following four reports/ documents have been submitted as deliverables outputs: -</p> <ol style="list-style-type: none"> a. Report incorporating recommendations based on the findings of five years' work for use by the government as input for making necessary policies and programmes for the knowledge economy. b. A template of collaborative and cooperative synergy amongst Industry-Academia-Government-Society for realizing a knowledge economy. c. Report identifying new streams/disciplines for the emerging knowledge economy d. Document outlining short courses / MDPS/ long term educational program/ courses in Knowledge Technology - R&D and Innovation Management for key decision makers
Start Date Duration (in months):	29/3/2006 36 months (further extended by 24 months)
Status of Project:	Project completed on 31/03/2011

Project Title	Design and Development of e-learning contents for e-security solution developers
Executive Agency:	C-DAC, Noida
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Project Objectives:	<p>To design the e-Learning contents of e-security covering number theory, cryptographic techniques for different target group of users to become e-security solution developers</p> <p>Identification of different e-security case studies for various levels of security.</p> <p>Identification of already developed libraries and solutions for developing new e-security solutions in an application.</p> <p>To map the identified case studies with underlying number theory and mathematical models and cryptographic mechanisms to enable understanding of design and development of solutions.</p> <p>To develop e-Learning contents for each of the case studies in terms of number theory, mathematical models, cryptographic algorithm used, explanation of the integration of the code for the development of e-security applications.</p> <p>To develop the contents of international standards with AICC/SCORM compliance on e-security for e-learning.</p> <p>To deploy the e-Learning contents developed on the server in the data center for access.</p> <p>To implement the programmes mentioned for students of engineering (Postgraduate/engineering) in colleges</p> <p>To identify departments of IT in Central and State Government to implement programme for system administrators and officers incharge of e-security.</p> <p>To implement the programme for executives and officers of state and central government offices and system administrators</p> <p>To implement programmes to educate scientists and postgraduate students to enable them to develop new solutions for e-security.</p>
Achievements/ Outcome	Successfully designed and implemented e-Learning Content on e-security for three target group of users viz. Post Graduate/ Engineering students, System Administrators and e-security officers and Scientists. The developed content has been hosted on CDAC, Noida and DOEACC websites and same are being accessed by users in the e-learning mode.
Start Date Duration (in months):	16/10/2006 24 (extended by 10 months)
Status of Project:	Project completed on 15/08/2009

Project Title	Brihaspati phase-2: Development of Open source content delivery tools with advanced features
Executive Agency:	IIT, Kanpur
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Project Objectives:	<p>To develop the Brihaspati Virtual Classroom tools further with better and modified architecture.</p> <p>To enhance the existing tools to include the more features and to make them standard compliant.</p>
Achievements/ Outcome	A learning Management System (LMS), Brihaspati –2 with many new features was developed and released as open source at sourceforge.net/projects/brihaspati . The same LMS has been continuously used and tested at IIT, Kanpur. This has made it possible to test the system and identify bugs and fix them. Currently, the system has functionalities to support SCORM, extensive multilingual support, chat whiteboard and much other functionality. IIT, Kanpur may add more functionalities depending on users feedback. This system has been used/ shown interest by about 85 Institutes. The user and developer document is available online and distributed along with the source code. The system is now being converted to full fledged EdRP services over clustered servers under National Mission in Education through ICT (NMEICT). The system can be visited at http://brihaspati.iitk.ernet.in:8080/brihaspati/servlet/brihaspati . The system is extremely stable and running without any problem.
Start Date Duration (in months):	09/10/2006 36
Status of Project:	Project completed on 16/10/2009

Project Title	Training of Teachers in E-learning
Executive Agency:	DOEACC (Imphal, Calicut and Gorakhpur)
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URL:	http://www.doeacc.org.in http://www.doeaccimphal.org/ http://www.doeacccalicut.ac.in http://www.doeaccgkp.edu.in
Project Objectives:	To introduce fundamentals of E-learning , H/w and S/w and train teachers for implementing e-learning for the better educational methodologies.
Achievements/ Outcome	<ul style="list-style-type: none"> ▪ 360 teachers to be trained (120 from each centre) in use of e-learning in education. Actual 404 teachers have been trained from these 3 DOEACC centres ▪ Trained teachers will be able to locate and use/ reuse the course contents and create their own content in e-learning in their area of specialization and they will act as master trainer for their parent Institute. ▪ Create multiplier effect to use ICT technologies and create awareness about the usage of information tools, blending it with traditional skills to enhance quality and productivity in education
Start Date Duration (in months):	14/05/2007 18 (extended by 10 months)
Status of Project:	Project completed on 31/10/2009

Project Title	Design and Development of Service Oriented Architecture based Standards Compliant e-Learning Framework with Personalized learning Features
Executive Agency:	CDAC, Hyderabad
Principal Investigator:	Shri DK Jain
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Project Objectives:	<ul style="list-style-type: none"> • To conceive a service-oriented architecture for standard compliant e-learning framework complemented with web mining and Rich Internet Application technologies. • To develop web 3.0 (semantic web) based personalized learning environment. • To study the interoperable e-learning standard and arrive at possible solution for developing a conversion tool for creating SCORM compliant content.
Achievements/ Outcome	<p>Project has brought out a personalized e-Learning framework, with e-learning services having capability of course organization and management, provision for conducting adaptive assessment and collaborative services. It also provides supportive tools for Instructors, like Learning Path Editor for rearranging or redefining the learning path of the learners, dashboard facility for monitoring the continuously changing learning style of learners and suggesting the recommended learning pattern. The framework has also adopted e-learning standards for web enabled e-content and assessment, namely Sharable Content Object Reference Model (SCORM) standard for Course Organization and Question and Test Interoperability (IMS QTI) specification for Assessment.</p> <p>The system was tested for the students of Post-Graduation Diploma in Advanced Computing (PG-DAC) course offered by CDAC and Core Competency in Software Process Management (CCSPM) on line course offered to JNT University, Hyderabad. The learners with various type of learning style have been captured in this field trial process and the learner has benefited by different personalized learning path for the same course. The knowledge acquired during the project implementation was also disseminated to the teacher and learner fraternity by conducting two national level workshops and other workshops in association with JNT University, Hyderabad</p>
Start Date Duration (in months):	12/01/2010 24 (extended by 18 months)
Status of Project:	Project completed on 30/06/2013

Project Title	Design and Development of a Framework for Adaptive Instruction
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Project Objectives:	<ul style="list-style-type: none"> i.To develop an open source Framework for Adaptive Instruction (FAI) to deliver instruction in personalized manner ii.To develop Adaptive Instruction for two sixth standard subjects and two IT courses using the framework iii.To set up an adaptive instruction framework server iv.To propose a specification for instructional markup language for FAI to enable large scale interoperable quick content creation v.To provide Indian language support to FAI vi.To develop convertor for creating Adaptive Instruction as SCORM 2004 compliant content
Achievements/ Outcome	An Open Source Framework for Adaptive Instruction was developed to deliver instruction in personalized manner and the content was organized according to learning objectives and pedagogical roles. Activities related to building learner model according to learning styles & prior knowledge and providing rich GUI interface for learners to view the adapted content in different mode were also completed. As part of achievements the framework was installed on a server, four courses content were adapted and options are available for generating SCORM compliant content. Hindi support is also available in the framework. Workshop was conducted in which participants were able to create content from learners' perspective.
Start Date Duration (in months):	01/03/2010 24 (extended by 6 months)
Status of Project:	Project completed on 31/08/2012

Project Title	Video Compression and Decompression techniques
Executive Agency:	CDAC, Mumbai
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Project Objectives:	To improve the performance of video compression and decompression techniques based on H.264 for lower bandwidths (below 128 kbps) and to provide better quality of video and audio at lower bandwidths and lesser latency for e-Learning.
Achievements/ Outcome	With regard to Image codec using MATLAB, which uses lesser bandwidth was developed. For this, free installation of 'MCR installer' was used at the client end and is tested on Windows as well as on different flavours of Linux. For video codec using H.264, modified ffmpeg codec with webm technology was used. Merging of image and video to bring them in the single UI was completed as a tool. The image codec and Video encoder was shared with IIT Kanpur for integration with Brihaspati LMS, developed by IIT, Kanpur. Two papers on the above project were published. Workshops were conducted on "Beagleboards for video streaming" and "Webm Technology".
Start Date Duration (in months):	01/07/2010 18 (extended by 10 months)
Status of Project:	Project completed on 31/10/2012

Project Title	Content generation, adaptation and distribution in m-learning environment for Mobile phone applications,
Executive Agency:	CDAC, Hyderabad jointly with Thiagarajar College of Engineering, Madurai
Principal Investigator:	Shri DK Jain
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Project Objectives:	<ul style="list-style-type: none"> To identify and develop mobile learning content suitable for Finishing School students To adapt and render the developed content for mobile phones To develop mobile video streaming application To deploy and distribute the mobile learning content to the students of finishing schools
Achievements/ Outcome	Various streaming techniques were explored and Real Time Streaming Protocol (RTSP) was chosen for streaming video to both J2ME and Android mobile phones. MENTOR (MOBILE VIDEO CONTENT MANAGEMENT and ONLINE DELIVERY system), a mobile learning software was developed for distributing video lectures to students mobile phones. Appropriate video content is being delivered based on audio, video capabilities of student's mobile phone. Four courses namely C-Programming, Data Structures, Soft Skills and Entrepreneurship were identified for m-learning content development. This software is currently being used at C-DAC Hyderabad, Dr.Reddy's Laboratories Ltd and School of IT, JNT University, Hyderabad. A total of 238 members were trained in mobile learning and related technologies during various workshops and hands on programs conducted both in Hyderabad and Madurai
Start Date Duration (in months):	07/03/2011 12 (extended by 18 months)
Status of Project:	Project completed on 06/09/2013

Project Title	Online Labs (Olabs) for School Lab Experiments
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Project Objectives:	<p>To offer a joyful interactive learning experience for the student and to provide an environment to extend, improve, refine, and assist the learning and/or experimentation process in the subjects of Physics and Chemistry areas. Each lab will consist of 7-10 experiments.</p> <p>The experiments will comprise a user-friendly interactive visual front-end, working in synchronization with a backend, possibly consisting of a simulation-engine running on a server or actual measurement data or a real experiment.</p>
Achievements/ Outcome	Online practical science experiments with content aligned to CBSE syllabus for the subjects of Physics and Chemistry for class 9 & 10 that include interactive simulations based on mathematical models, videos and rich interactive animations were generated. More than 30 experiments are available for free public access on http://www.olabs.co.in . Access to Online Labs is free for Schools upon registration. CD version of Olabs is also available for schools with restricted or no internet usage. By the time project ended, more than 30 schools have deployed Olabs, various workshops were conducted and about 535 teachers were trained, over 2600 students have registered on Olabs website and over 16000 visits to Olabs website were logged. CBSE had shown interest in usage of OLabs in their 13500+ schools after incorporation of feedback given by their expert team.
Start Date Duration (in months):	09/03/2011 12 (extended by 6 months)
Status of Project:	Project completed on 31/08/2012

Project Title	Adaptable e-Learning Accessibility Model for the Disabled
Executive Agency:	CDAC, Knowledge Park, Bangalore jointly with CDAC Hyderabad
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Project Objectives:	<p>(i) Design, Development of Adaptable and Accessible E-Learning model for mentally disabled concentrating on the cognitive and learning disabilities of mildly retarded segment under Autistic Spectrum Disorders (ASD).</p> <p>(ii) Integration of the designed Accessible E-Learning model with a SCORM (Shareable Content Object Reference Model) Compliant Learning Management System</p> <p>(iii) Development of Accessible E-Learning web Portal addressing the educational needs of the mentally disabled (mildly retarded segment under Autistic Spectrum Disorders) with local language support</p> <p>(iv) Design and development of the above mentioned accessible E-Learning environment for access through Mobile devices.</p> <p>(v) To cooperate and collaborate with agencies like, National Institute of Mentally Handicapped (NIMH), Hyderabad, National Institute of Mental Health and Neuro Sciences (NIMHANS), Bangalore, IISc. Bangalore, IIIT-B, JNTU and other National and International Institutions and Research Institutes.</p> <p>(vi) Pilot implementation: Implementation at schools/ user premises, User Training/ taking feedback, experimenting and fine tuning, release of Stabilized Product.</p> <p>(vii) To organize study programmes, Lectures symposia, exhibitions and similar promotional activities related to Accessibility. Awareness and training programmes in Triple Space Computing for R&D, industry and academic institutions.</p> <p>(viii) Two workshops are proposed to be organized over a period of two years.</p> <p>(ix) Under the perspective of training the trainer, the following facets of learners would be covered in collaboration with user agencies.</p> <ol style="list-style-type: none"> a) For Parents: Innovative courses and structured training like Early Intervention, Awareness Programmes b) For Teachers: Different graduation level domain specific courses c) For Occupational Therapist: Courses specific to them like Rehabilitation Psychology, Disability Rehabilitation.
Achievements/ Outcome	New features were added to Adaptable and Accessible e-Learning (A2EL) framework - Beta V 1.1, which was released on 15th July 2013. Activities related to multilingual enablement of the A2EL Framework wherein translation of the tool content to Kannada and Telugu is being done, enhancements to Decision Support System (DSS) and training package creation modules are being handled, Apache Licensing version 2.0 is being explored w.r.t Productization, working on prototype content and CSS are being carried out. Final major version release is being planned. Translation and validation of web portal content from English to Telugu, Kannada and Hindi is completed. Beside the above activities installation/ upgradation of A2EL software and user hand holding training were carried out at different special schools including National Institute for the mentally Handicapped (NIMH). Awareness Programmes through workshop etc. were conducted where A2EL framework was demonstrated.
Start Date	10/05/2011
Duration(in months):	24 (extended by 11 months)
Status of Project:	Project completed on 31/03/2014