

Open Course Creation by Learners: A Way Forward in Agriculture Education

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Transforming knowledge and skills to human resource and generating employment opportunities in agriculture sector is vital for improvement in socio economic condition. Majority of farmers in developing countries are still lacking in formal education and not aware of latest farming technologies. They have limited access to learning for improving livelihood due a number of reasons like time, physical, and financial resources constraints. Moreover, learners are isolated geographically and socially in farming as a sector. The education system can play an important role in strengthening the capacity of the agriculture sector to undertake new emerging situations at global level in trade, climate change and financial condition and to promote the livelihoods of rural families. These developments are in a sense causing a paradigm shift in international agriculture; it has started moving from largely subsistence farming to more of commercial agriculture which is resulting in growing demand for agricultural education.

The education system should provide timely need based demand-driven knowledge and skills to farmers and other stakeholders. There is tremendous pressure to cater needs of millions and millions of people. The traditional education system is working but is certainly insufficient to meet the growing demand of education in agriculture. Due to limitations of higher education in agriculture in many developing countries, reaching out to potential learners with high-quality agricultural content is a great challenge. It requires innovative methods in content development, management, and delivery. There is an urgent need to harness other approaches of education such as Open and Distance Learning (ODL) and wider and nuanced use of Information and Communication Technology (ICT) along with new methods of pedagogy in agricultural education. Use of innovations and technologies in generating and delivering the learning resources and creating the learning environment is increasing to enhance the reach and effectiveness of education. This development is leading towards Technology mediated learning.

Open Educational Resources (OER) and new collaborative online spaces such as Web 3.0 have excellent potential to open up traditionally closed educational systems by taking advantage of the

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growing availability of digital network, improved access to computing in learning centers, and new forms of intellectual property protection. Innovative models are now making available many university-level courses as global public goods, no comparable initiative, so far, have been made for the collaborative creation and unrestricted use of learning materials in the agriculture and food domain (Balaji et.al, 2010). Therefore, such innovative models need to be built in agriculture to harness the technologies for enhancing reach and effectiveness of education in far flung and rural areas.

In this direction, a consortium of the School of Agriculture, Indira Gandhi National Open University (IGNOU), New Delhi; School of Agricultural Science, Yashwantrao Chavan Maharashtra Open University (YCMOU), Nasik; Directorate of ODL, Tamil Nadu Agricultural University (TNAU); and Division of Knowledge Management and Sharing, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has designed and implemented a project entitled “Innovations in Technology Mediated Learning: An Institutional Capacity Building in using Reusable Learning Objects in Agro-horticulture”. The project was funded by National Agricultural Innovation Project (NAIP), Indian Council of Agricultural Research (ICAR). The School of Agriculture was the lead partner. In the project, an innovative content management system called “AgriLORE” was developed which allows for the collaborative creation and unrestricted use of learning materials in agriculture. The collaborative learning materials were developed in the form of Re-usable Learning Objects (RLO).

RLOs are the e-educational resources available freely and openly to anyone who can use, re-use, remix, recycle and redistribute it in restricted or un-restricted manner. RLO is smallest stand alone and an independent unit of learning designed for re-use in multiple instructional context. A RLO is a type of online instruction that provides a digital educational resource that can be scaled and shared from a central online repository in the support of instruction and learning. About 500 RLOs were developed on five themes of the six selected crops. An aggregation tool which allows the learners to group the RLOs into courses based on their requirement was implemented to build a larger curriculum (modules/course). Development of courses through meaningful grouping of RLOs to provide the educational resources needed to fulfill credit requirements in a certification process is an important innovation attempted.

AgriLORE platform

AgriLORE platform using NAIP-supported *agropedia* architecture has been developed as a National repository of RLOs and courses in agriculture. AgriLORE platform (www.agriore.org) is the one place store for creating, sharing, searching and easy accessing of learning objects related to agriculture and horticulture crops which can be of great use to the learning community of agriculture universities, research institutes, departments of agriculture and horticulture, extension personnel and farmers. It allows for closed-group review and publication of expert-derived RLOs, while allowing sharing of practitioner tips and notes, from learners and faculty, in a different space. Such two-track approach is necessary to sustain dynamism in this knowledge space. The tagging standards based on IEEE Learning Object Metadata (LOM) standard have been implemented for learning materials and RLOs. This is an innovation of its kind for ease search and retrieval of information. This has facilitated in building robust metadata structure for the AgriLORE's RLO creation and upload.

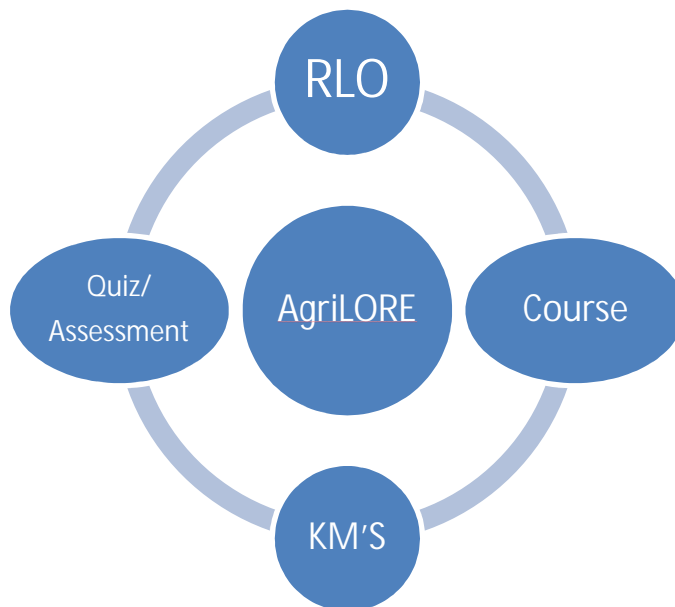


Fig.1: Main components of AgriLORE platform



Fig2: Snapshot of AgriLORE platform

AgriLORE portal has also been designed and implemented to have provision for creating profiles for courses, this is anticipated to support open and distance learning. This platform built on Drupal, content management system, has the facility to upload content in multiple formats like PPT, DOC, PDF, multimedia (MP3, FLV) etc for a single RLO. Knowledge models for 6 selected crops viz. rice, potato, grapes, tomato, banana and mango were developed which are necessary for tagging the RLOs and constitute the vocabulary in the keyword attribute in the RLO metadata (profile) (Fig. 3). Every RLO has a profile, and that determines its relationship with other RLOs. The relationship between concepts and RLOs are based on a granularised structure and constrained vocabulary that are used in Crop Knowledge Models.

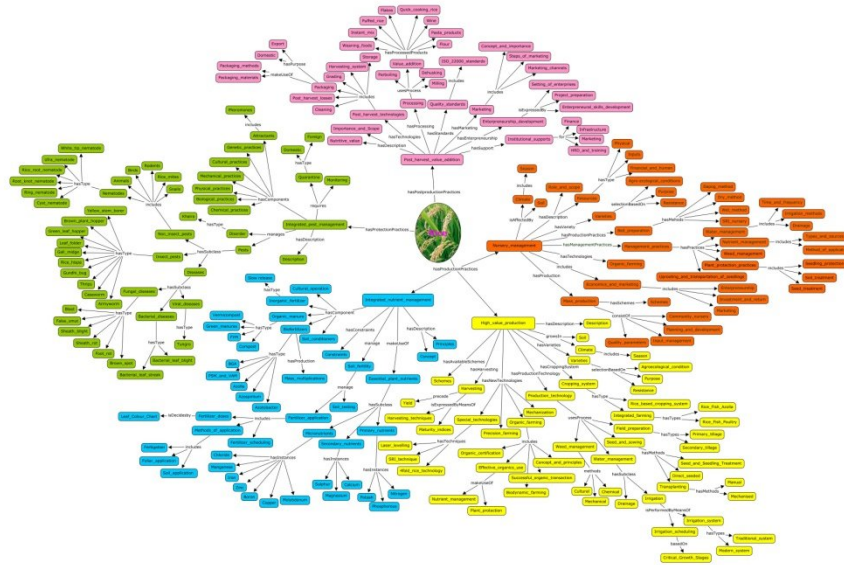


Fig3: Rice Knowledge Model

Re-usable Learning Objects (RLO)

RLO is an independent and self-standing unit of learning content that is predisposed to reuse in multiple instructional context (Polsani, 2003). It is a type of online instruction that provides a digital educational resource that can be reused, scaled and shared from a central online repository in support of instruction and learning. RLOs are available freely and openly to anyone who can use, re-use, remix, recycle and redistribute it in restricted or un-restricted manner. Each RLO supports a single learning objective. (Source: <http://ecolearnit.ifas.ufl.edu/concept.asp>)

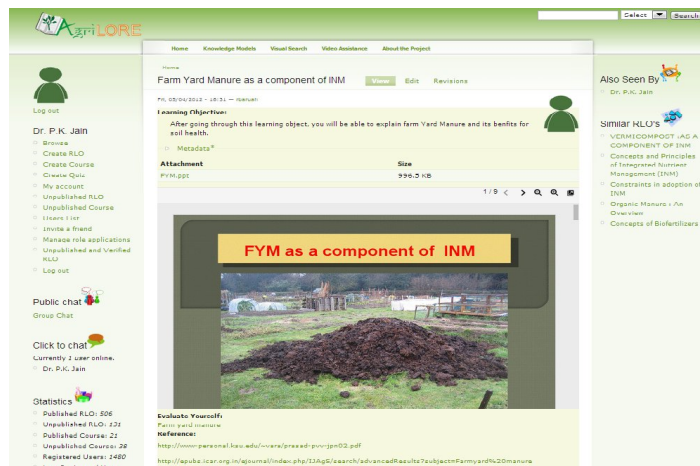


Fig.4: RLO in AgriLORE

Creation of RLOs

Expert groups were formed for each theme consisting academicians and researchers of Agricultural research institutes, universities, open universities and other organizations to design and develop these RLOs. Two types of RLOs were identified under each theme, one generic RLOs and other crop specific RLOs. Generic RLOs are those which are applicable in all crops e.g. basic concept of integrated nutrient management will be the same for all crops therefore this RLO need not to be developed separately for each crop, one RLO developed on basic concept of INM is utilized to form the courses on INM on various crops. Crop specific RLOs are those which required crop specific information and learning. Generic RLOs are being used in all crops to avoid the duplication of effort and cost.

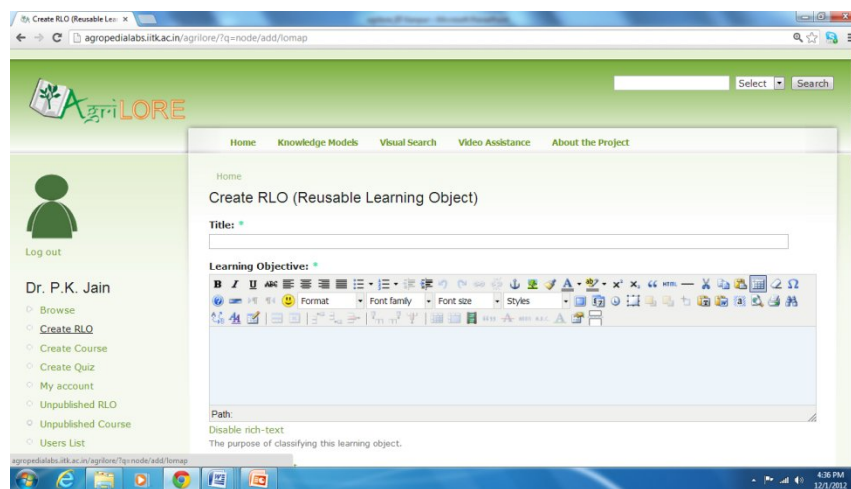


Fig 5: RLO Creation tool on AgriLORE platform

The RLOs contain the following mandatory elements which constitute the format of RLOs:

1. **RLO Title:** (*Self contained and in brief*) -----

2. **Learning Objective:** (*Preferably Single Objective*)-----

3. **Contributor / Co-contributor:** (*First author, Co-author & Co-contributor*)-----

4. **Abstract:** (*Short Description of Content in 3-6 lines*)-----

5. **Intended End User:** (*Farmers, Extension Worker, Agro-input Dealers, UG Student, PG Student, Researcher & Others*) -----
6. **Complexity Level:** (*1: Simple, 2: Difficult, 3: Very Difficult, 4: Complex, 5: Very Complex*)-----

7. **Duration of RLO:** (*minutes*)-----
8. **Copy right and other restriction** (Whether copyright or other restrictions apply to the use of this learning object) -----

9. **Version:** (*Draft, 1st version, revised version*) -----
10. **Status:** (*incomplete / complete*) -----
11. **Content / Upload RLO:** (*Combination of Text, PPT, Diagram, Picture, Graph, Audio-video, and Animation with supportive web links in logical and interactive form*)- In the first stage of the project it was finalized to create the RLOs using PowerPoint presentation as base.
12. **Keywords:** (*Metadata*) automatically generated keywords from the knowledge models developed the six crops tagging of RLOs.
13. **Language:** (*English, Hindi, Marathi, Bengali, Tamil*)-----
14. **Format:** PDF, PPT, DOC, FLV, MP3, MP4, OGG/OGV -----
15. **Evaluate yourself / Assessment:** *5 to 6 single answer Self Check Questions (Multiple choice questions, fill in the blank and/ or true/false types)*

16. **References:** -----

These mandatory elements were selected based on the principles of andragogy and pedagogy to facilitate the learning environment and helps in ease search and retrieval of information. Creation of RLOs in AgrilORE is very systemic and structured process. It starts with conceptualization of RLO, to create of learning content offline, submission of RLOs in AgriLORE, reviewing by editors, and final publication for access to everyone (Fig. 6).



Fig. 6: Workflow of RLO/Course

The RLOs were prepared using PowerPoint presentation (Fig.4). They are prepared taking into consideration of level of 8th pass learners. The text content of the RLO is assisted with pictures, graphic and video where required to facilitate clear understanding of concept. Emphasis is given on presenting the knowledge in visual ways using animation and graphics. All the prepared RLOs were hyperlinked using automatically generated metadata tags as well as equipped with self-assessments. The following five themes and six selected crops namely rice, potato, tomato, mango, grapes and banana (Table 1) were covered.

Table 1: Number of RLOs Developed under various themes

Themes	Number of RLOs developed
Nursery management	100
High value crop production	100
Integrated nutrient management in agro-horticulture	99
Integrated pest management in agro-horticulture	109
Post harvest management and value addition in agro-horticulture	92
Total	500

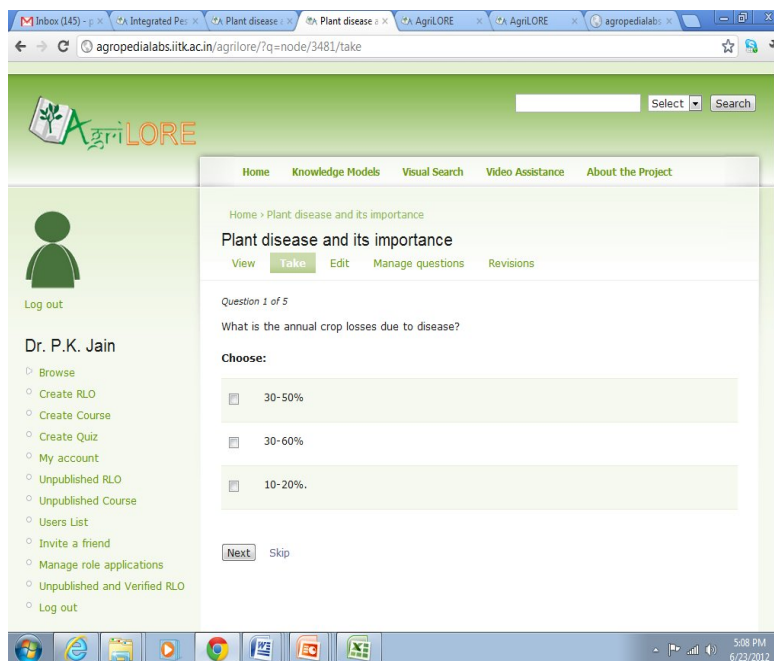


Fig7: Sample question

Aggregation of RLOs into Courses

AgriLORE enables learners to design and develop the courses based on their needs by meaningful grouping of RLOs out of the available pool. A course consists of a set of RLOs. The collection of 500 RLOs which was developed, by themselves, have sound pedagogic value and can be used in various learning/instruction contexts: instructor-led, learner-managed or facilitated by a community. Further, the RLOs developed can be structured in to various courses based on the learners' requirement. Learners can form courses by meaningful grouping of RLO's to provide the educational resources needed to fulfill credit requirements in a certification process. Development of curriculum through meaningful grouping of RLO's to provide the educational resource needed to fulfill credit requirements in a certification process is an important innovation (Fig. 8 to 11).

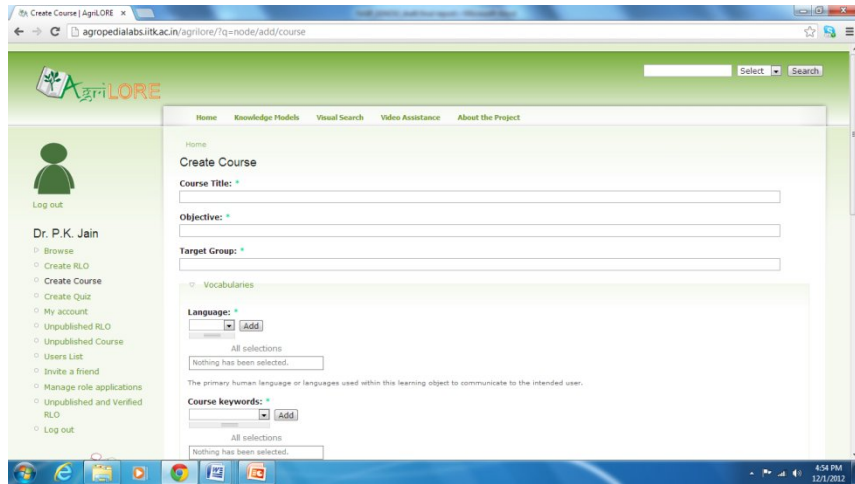


Fig 8: Course creation tool

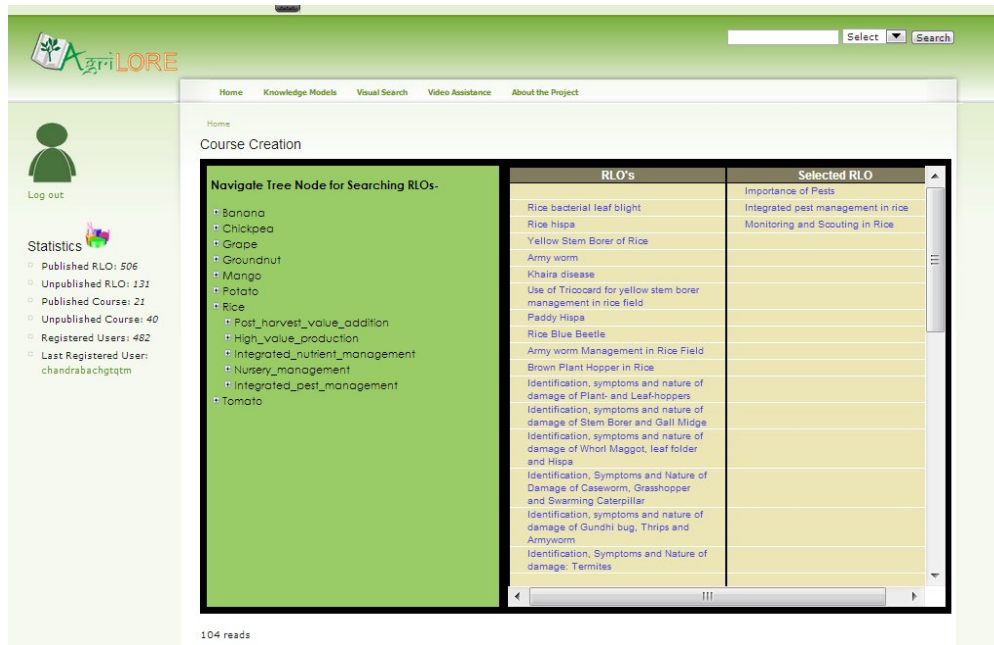


Fig.9: RLO aggregation tool

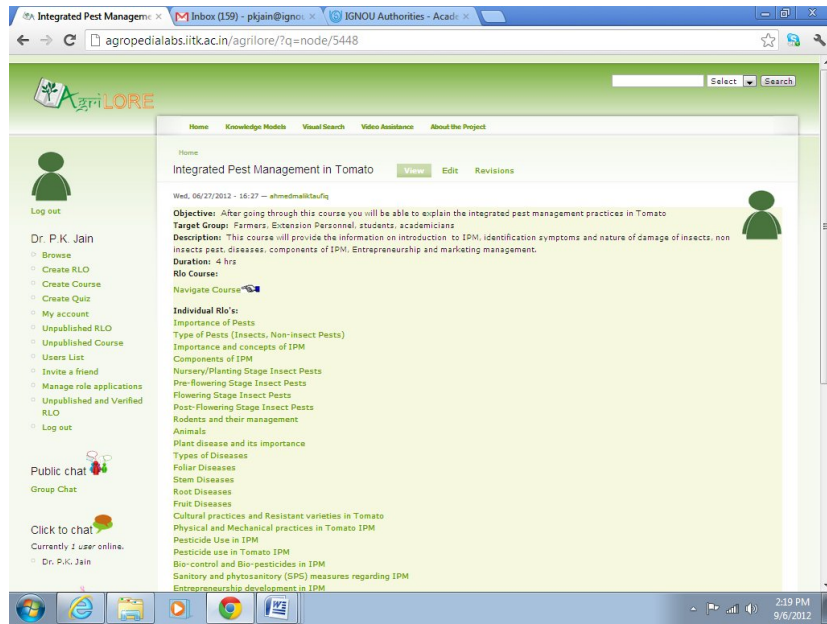


Fig 10: Snapshot of Course in AgriLORE

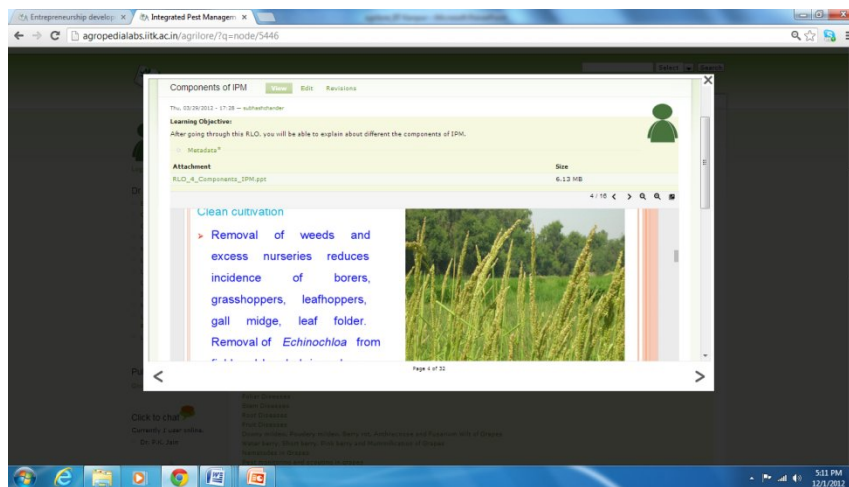


Fig. 11: Course navigation tool

Learners' Support and Delivery

In the delivery side, the consortium partners make use of multi-modal delivery system using online availability of RLOs, or offline using DVD/CD's or print. The standard framework of designing self-instructional material is used to develop RLOs. Another important feature of the AgriLORE platform is the utilization of social networking techniques to enable the learners to have access to faculty time and expertise through a digital forum using PC-based web browsers (Fig. 12 and 13). For the purpose, online social networking techniques have been experimented.

The platform provides social networking in the form of discussion board, one to one chat and group chat. It is networked in such a way that it provides us a network with numbers of learners accessing information on same RLO, number of RLOs prepared by same author and number of similar RLOs.

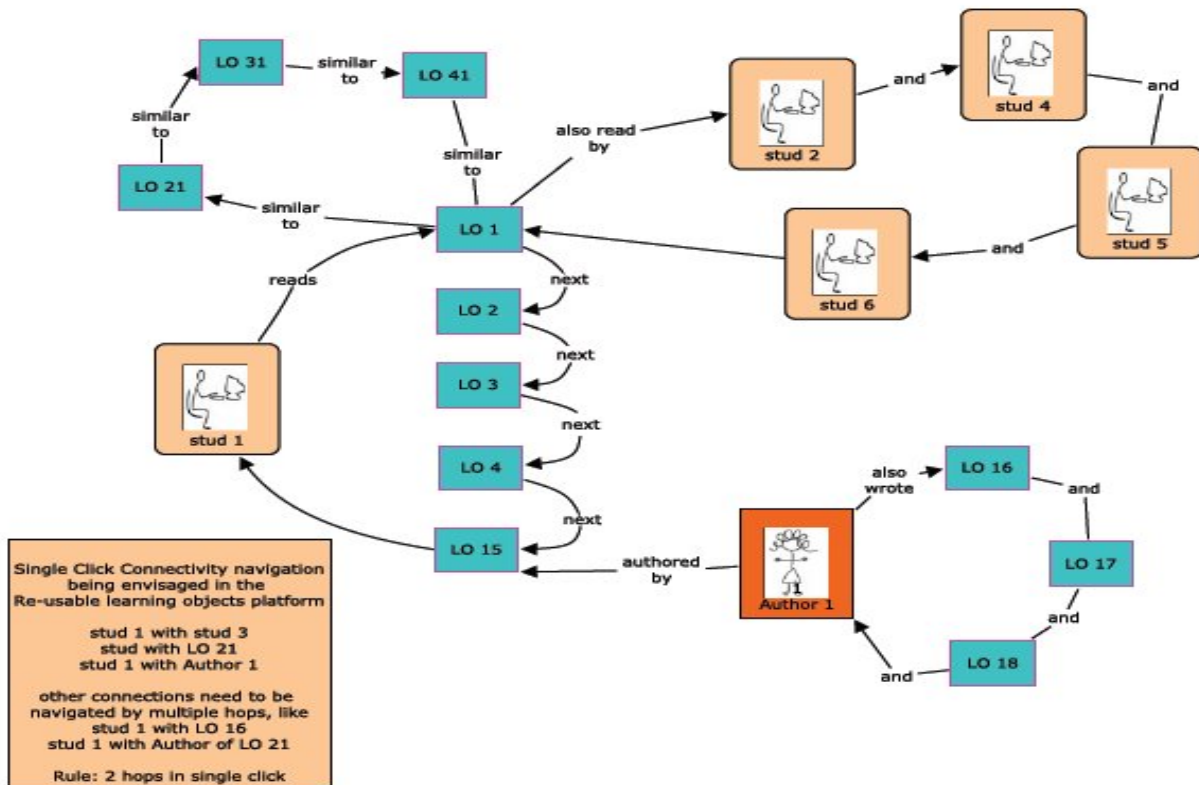


Fig.12: Networking in AgriLORE

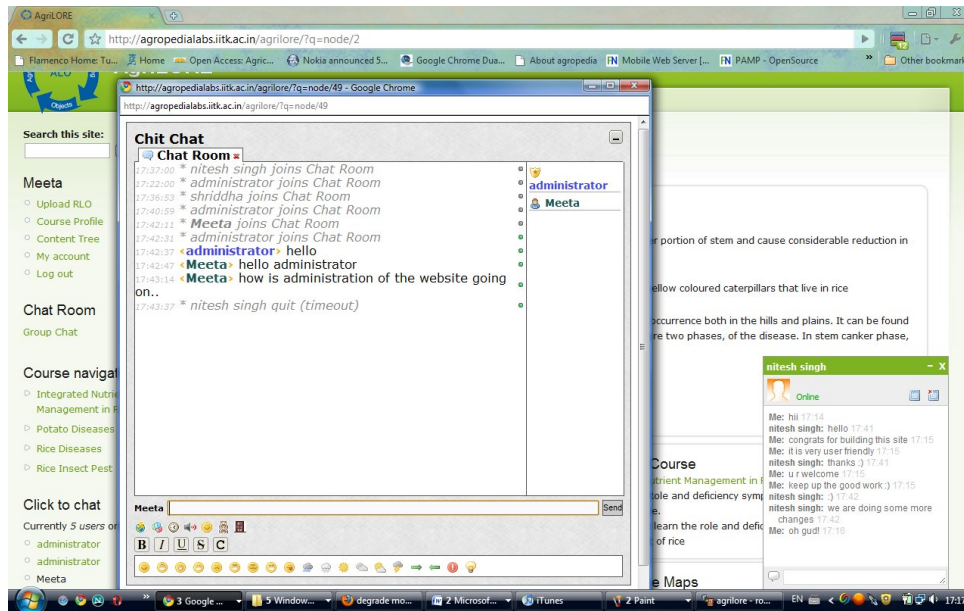


Fig.13: Chat Interfaces (Group and One-to-One)

Summary:

The learners in agriculture sectors are spread out in large geographical and far flung areas. The education infrastructure in agriculture is not sufficient to reach out such large potential learners with quality learning materials. Thereby, there is a need to use technology mediated innovative methods in content development, management and delivery. Keeping this in view, National Agricultural Innovation Project (NAIP)-ICAR awarded a project to consortium of IGNOU, YCMOU, TNAU and ICRISAT on “Innovations in Technology Mediated Learning: An Institutional Capacity Building in using Reusable Learning Objects in Agro-horticulture “ with the ultimate goal of improving livelihood of rural learners through enhanced access to learning opportunity. A learning management system “AgriLORE” was developed for creating, sharing, searching and easy accessing of learning objects related to agriculture and horticulture. Learning materials were developed in the form of Re-usable Learning Objects (RLO) on six crops namely rice, potato, tomato, grapes, banana and mango. About 500 RLOs were developed on five themes viz: nursery management, high value crops production technology, Integrated Pest Management, Integrated nutrient management, and post harvest management and value addition in agro-horticulture. This project makes use of the practice of semantic web technologies to build and manage a collection of re-usable learning objects which can be accessed in easy-to-navigate

ways. These are used to generate learning materials at a participating institution which enrolls and mentors farm-based learners. The entire chain of generic RLO creation, validation repository and its re-use in a local context and assessment of its value in learning are in practice in this platform. An aggregation tool which enables open course creation by the learners through meaningful grouping of RLOs is implemented which is an important innovation.

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