Learning Networks for Lifelong Learning

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Content

- Background: Learning Networks Programme
- More in detail: Model and Simulation of a LN:

“Increasing Learner Retention in a Simulated Learning Network using Indirect Social Interaction”
(draft article)
Programme Learning Networks for Lifelong Learning

- Internal OUNL/OTEC programme 2003-2008, with additional external funded projects
- Aim: development of new learning technologies to support lifelong learning
- Major outcome types:
  - models and theories
  - specifications of learning technologies
  - prototypes of new technologies
- Dissimination via: publications, open source channels (sourceforge), specification bodies
Programme

Theme 2: Make & Use Activity Nodes

Theme 3: Learner Positioning

Theme 4: Navigation

Theme 1: Integration
Learning Networks for Lifelong Learning

A learning network is a group of persons who create, share, support and study learning resources ('units of learning') in a specific knowledge domain.
So, a network in the following sense

A group of persons:
- connected to each other in a **social** sense
- connected to each other in a **technical** sense
- connected to relevant **learning resources**
- connected to each other in order to **learn** from & with each other
  (also producing new learning resources)
- as independent as possible of constraints like: location, institution, job, time, specific technologies
- persistent over time to support lifelong learning in a certain field
How to realise Learning Networks for Lifelong Learning?
Several views of a Model of a Learning Network

- Learning Network modelled as a Graph
- Use Case Model
- Architectural Model
A learning network can be represented as a graph of ‘activity nodes’ (runs of units of learning) within some knowledge domain.
LN Graph with a learner track
Patterns of Collective Tracks Emerge
Learner Positions and Objectives
Planned Learner Routes ("curriculum")
What activities do users perform in a Learning Network?

=> Use Case Model
use case
use case

Learning Network

- create (sub-)LN
- search AN
- get/access AN
- study AN
- CRU AN
- feedback
  - communicate
  - collaborate
- perform support activities
- CRU learning dossier
- training
- enrollment

role: LN manager

lifelong learner

role X, role Y
eg student, eg tutor

individual, group

provider

software agent

LN member
What are the functional components that can be identified in a Learning Network Infrastructure?

=> Architectural Model
Architecture (see: special issue BJET Technology & Lifelong Learning Nov. 2004)
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LD tools
Three Core Issues in a Learning Network

1. How to **make & use** pedagogical well designed, interoperable and reusable units of learning in the LN?
2. How to **position** learners in a LN?
3. How to help learners to **navigate** in the LN?
ad 1. Make & Use Units of Learning

- **IMS Learning Design** is used to model the units of learning within the LN
- **User-friendly Tools** editing, cm, runtime
- **Quality mechanisms** to support the building and identification of high quality units of learning
- **Community Policies** to stimulate authoring, use and reuse
- ...

Variety of Projects in the Programme (ASA, Alfanet, CopperCore, Unfold, Telcert, Jisc/open framework project)
ad 2. Learner Positioning

- Interoperable, secure ePortfolios
- **Assessment** issues (e.g. of informal required competences)
- **Mapping** of competences of individuals between different, but comparable learning networks
- Formal **accreditation** and examination issues
- **We are looking at**: integrative test framework, renewal, extension of QTI, LSA to support positioning

Projects: testing framework, revision QTI in IMS
ad 3. Now in more detail: How to setup **Navigational** support within a Learning Network
Navigation questions within LNs

- I want to know something more about topic X, is there an adequate unit of learning available?
- What is, for me, the best route to attain a certain learning objective (or certificate, diploma, ...)?
- I have done X and Y, what would you advise me to do next?
- ...
Problems with navigation in LNs

- In any field per definition a very large number of possible units of learning,
- of a variable quality
- The number of units of learning change rapidly over time
- Nobody has a real overview of actual quality, number of possibilities, ...
So,
How to Organize a Learning Network under such constraints?
Our Approach

- Use of self-organisation principles from complexity theory, specifically principles of indirect social feedback ('stigmergy')
- Use of bio-inspired theories ('pheromones')
The paths of successful predecessors are used for advice
Netlogo Simulation of a LN

- Multi-agent simulation environment for research
- See Draft publication in handouts
Learners + Units of Learning in a LN
Properties
One of the Experiments with the Simulation

- Problem: what is the effect of indirect navigational feedback on study success (number of students that attained objective)?
- $2^4$ factorial design:
  - pheromone strength (0 or 100%)
  - matching error (0 or 100%)
  - disturbance in learner environment (0 or 100%)
  - quality of the unit of learning (0-100% or 100%)
- N=12 replications in every condition
- Every replication runs 260 simulation weeks (5 years). In total 49920 week cycles (runs about 10 hours on fast computer)
Outcome

- All main effects significant + interactions: pher-strength * matching error
  pher-strength * quality of unit of learning
Interaction Pher \* Matching-error
best versus worst case

no matching error, 100% quality and no disturbance \((F = 0.7816)\)  

100% matching error, 0% quality and 100% disturbance \((F = <.0001)\)
Outcome

- Overall influence Pheromones: 9% increase in proportion of students who attained their objective
- Matching-errors are compensated by pheromones
- Some quality variance is compensated by pheromones

(more details: see draft paper)
Thank You

More info:
www.learningnetworks.org
dspace.ou.nl