Collaborative Learning: Theory and Systems

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What is collaborative learning?

Collaborative learning is a reculturative process that helps students become members of knowledge communities whose common property is different form the common property of the knowledge communities they already belong to. (p.13, Koschmann, 1997)
What is CSCL?

Crossroads of CSCW and Collaborative Learning

CSCL

Collaborative Learning

CSCW
History of Educational Software

- CAI/Courseware
- ITS (prob.-solv., std. model)
- LIE (Multimedia, DM)
- CSCL (KB)
- eLearning (WBT)

### Taxonomy of CSCL systems

<table>
<thead>
<tr>
<th>Same place</th>
<th>Same time</th>
<th>Different times</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDC</td>
<td>Video-based asynchronous classroom</td>
<td></td>
</tr>
<tr>
<td>Satellite Collaboration System</td>
<td>CICLE/KIE Code-broker Swiki</td>
<td></td>
</tr>
</tbody>
</table>
Synchronous CSCL

Interface design principle:

WYSIWIS (What you see is what I see)
WYSIWITYS (what you see is what I think you see)

• Time and place restriction
WYSIWIS application

- Workspace Awareness
- Multi-user pointers / Multi-user scroll-bars
Asynchronous CSCL

WYSIWID (What you see is what I’ve done)

The system shows when, where and who has made changes to the shared object. This information is useful to facilitate collaboration with the current user and the past users.
Our projects

• AVC (Asynchronous Virtual Classroom)

  Agents reproduce the past activities in VC.
Asynchronous Virtual Classroom

• Agents supports:
  • To provide the feeling of being present at the classroom with other learners at the same time, despite the solitary participation.
  • To understand what happened in the classroom.
  • To facilitate interaction among learners.
Elements of AVC research

Conceptual Elements
- Asynchronous
- Virtual
- Classroom
- Agent
- Collaboration

Technical Elements
- Video, VR

AVC Project
Overview of AVC
The role of agents

- To replay the past learners’ actions that were stored and shared in the AVC system.
- To arrange the actions to replay, according to the learner’s past actions and the time of the video segment.
- To send / receive messages instead of the user.
- To take actions which teacher / learner described with AACML (Agent-based Asynchronous Classroom Markup Language).
Examples of elements of AACML
下記ユーザー名とパスワードを入力してOKボタンを押してください

[画像: ウィンドウの画面]
Knowledge Awareness in Computer Supported Collaborative Learning
Knowledge Awareness

KA is information about other learners' activities in the shared knowledge space for inducing collaboration.
Learning by Intellectual Curiosity

- Hatano & Inagaki, 1973: Human being has intellectual curiosity for learning by nature. So, we can learn something though the stimulation of curiosity, e.g., others statement, etc.

- Convergent curiosity (CC): This is generated by the lack of sufficient knowledge, and it is very useful in that the learner can acquire detailed knowledge.

- Divergent curiosity (DC): This occurs when there is a desire for learning and it makes the learner’s stock of knowledge well balanced by widening the learner’s interests.
# Types of Knowledge Awareness

<table>
<thead>
<tr>
<th>Same time</th>
<th>Different time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Same knowledge (CC)</strong></td>
<td><strong>Different knowledge (DC)</strong></td>
</tr>
<tr>
<td>Who is looking at the knowledge? What knowledge are they looking at?</td>
<td>What knowledge did they look at?</td>
</tr>
<tr>
<td>Who is changing the knowledge? What knowledge are they changing?</td>
<td>What knowledge did they change?</td>
</tr>
<tr>
<td>Who is discussing the knowledge?</td>
<td>What knowledge did they discuss?</td>
</tr>
<tr>
<td>Who looked at the knowledge?</td>
<td>Who changed the knowledge?</td>
</tr>
<tr>
<td>Who changed the knowledge?</td>
<td>Who discussed the knowledge?</td>
</tr>
</tbody>
</table>
Features of KA map

1. Visualization of hyperlinks on the WWW and other learners’ activities.
2. Filtering the KA information according to learner’s interests and activities.
3. Recommending the suitable leaner as a collaborator using learners’ profiles.
COALE

- Adaptive & Adaptable WBT system for CSCL
- Characteristics:
  - CSCL
    - Sharing Knowledge and annotations
    - Discussing with each other
  - Personalization
    - Recommending the content (Content awareness map)
    - Recommending learning mates (Learning-mate awareness map)
  - Customizable rule-based active web server
    - ECA (Event-Condition-Action) rules
Concluding remarks

- Papers are available at http://cscl.is.tokushima-u.ac.jp/ogata/
- Useful links: http://www.cscl-home.org/
- Interdisciplinary research: pedagogy, computer science, social science, cognitive science, psychology.