Course: Educational technology

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Scripting by typology, Ghent University

Scripting CSCL

Tagging Thinking Types in Asynchronous Discussion Groups: Effects on Critical Thinking

Scripting by typology, Ghent University

Aim of the study

• implement asynchronous discussion groups within a university course of educational science
• to explore how critical thinking processes can be facilitated by means of computer-supported scripts
• use of thinking types as a way to scaffold students' online discourse
Collaboration scripts are the most important design elements in computer-supported collaborative learning (CSCL) and aim to support learning activities by structuring otherwise deficient interactions.

“ A script describes the way students have to collaborate: task distribution or roles, turn taking rules, work phases, deliverables, etc. This contract may be conveyed through initial instructions or encompassed in the learning environment.”

Dillenbourg and Jermann (in press, 2007).

**Types of scripts**

1. Macro and micro scripts

Dillenbourg and Hong (submitted) distinguish two kinds of scripts:

- **Micro-scripts** are dialogue models, e.g. an argumentation model that states that if student A makes an argument, Student B is prompted to propose a counter-argument.

- **Macro-scripts** are pedagogical models, i.e. a sequence of activities that groups have to carry out

**Critical thinking**

"The ability to analyze facts, generate and organize ideas, defend opinions, make comparisons, draw inferences, evaluate arguments, and solve problems" (Chance, 1986)

"The intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action" (Scriven & Paul, 1992)
Critical thinking

Garrison (1992) identifies five stages of critical thinking:

- Problem identification
- Problem definition
- Problem exploration
- Problem evaluation/applicability
- Problem integration

Labeling

Central topic of CSCL research: How to facilitate online discussion and critical thinking?

→ possible approach: requiring students to classify and label each message to a specific functional category

- Students are asked to step back and to reflect
  - upon the ongoing discussion
  - on how to optimize the debate
- Labels visualize the predominance or absence of one or more knowledge types
De Bono’s (1991) thinking hats

<table>
<thead>
<tr>
<th>Critical Thinking</th>
<th>Thinking hats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem identification</td>
<td>White hat</td>
</tr>
<tr>
<td>Problem definition</td>
<td>Blue hat</td>
</tr>
<tr>
<td>Problem exploration</td>
<td>Green hat</td>
</tr>
<tr>
<td>Problem applicability</td>
<td>Black hat</td>
</tr>
<tr>
<td>Problem integration</td>
<td>Yellow hat</td>
</tr>
<tr>
<td></td>
<td>Red hat</td>
</tr>
</tbody>
</table>

The white hat

White remembers of paper. The white hat can be used to focus the attention on available information and encloses objective information.

What information do we have? What information do we need?

The blue hat

The blue hat is the color of the sky high above us. This hat stands for a reflective perspective to see whether the right topic is addressed.

What is relevant? Defining what to think about and deciding what is to be reached.

White hat

Annotation: 04:38pm April 8, 2005

I got the following information from an article on the internet:

There are three paradigms within computer-supported collaborative learning. Below I will describe these paradigms in broad outline:

- Transmission: a person brings information over to other students
- Learning through social interaction: within a group there is exchange of information
- Networking and learning: learning happens within a network

Source: http://www.ll.unimaas.nl/linksnaarbestanden/ArtikelSurf_20september.pdf

Blue hat

Annotation: 02:29pm April 8, 2005

Hey hey, Alright group members, how to handle all this information? Anyone an idea? I think - as Kirsten already mentioned that we have to reflect critically about e-learning and this in different ways. How do we look at this problem? Which aspects are important? I think the following aspects cover the whole problem:

- thinking about e-learning from different perspectives (as an instructor, as student, as the government)
- our own vision
- possibilities of e-learning with regard to educational problems
- limitations of e-learning with regard to educational problems

Some other suggestions? Do you agree with this? Do we need other aspects?
Hypotheses

Requiring students to tag their contributions by means of thinking types fosters

• the overall depth of critical thinking
• the depth of critical thinking for different categories and indicators
• the depth of critical thinking at successive critical thinking stages

Participants

• 3rd-year university students
• enrolled for the course ‘Instructional Strategies’ (N=35)
• 6 groups of 6 team members

Experimental condition

4 groups
23 students
Tag posts by a thinking hat

Control condition

2 groups
12 students
No tags to posts required

Task environment & procedure

• Asynchronous discussion
• Two-week time-span
• Starting point: column
• Assignment: construct arguments pro or contra e-learning based on theoretical or empirical evidence
Discussion environment

Content analysis

Analysis scheme based on Newman et al. (1995)
- 10 critical thinking categories
- positive and negative indicators

Complete communication was analyzed (N=569 messages) by 2 trained coders

Messages as unit of analysis

Critical thinking categories
- Relevance
- Importance
- Novelty
- Bringing outside knowledge
- Justification
- Critical assessment
- Linking ideas
- Resolving ambiguity
- Practical utility
- Focus of the discussion

Results

- Overall depth of critical thinking
- Depth of critical thinking for different categories and indicators
- Relating the findings to Garrison’s (1992) stages of critical thinking: depth of critical thinking at successive stages
Overall depth of critical thinking

- Evidence for critical thinking in both conditions
- Significant deeper critical thinking in experimental condition ($F(1, 416)=364.544; p<.001$)

Depth of critical thinking for different categories

- Patterns are quite similar for both conditions
- Experimental condition
  - more focused discussions ($F(1, 416)=1550.510; p<.001$)
  - more new info and ideas ($F(1, 352)=21.955; p<.001$)
  - more linking facts ideas ($F(1, 31)=3.024; p<.092$)

Depth of critical thinking for different indicators

Multinomial logistic regressions indicate that

- being in the experimental condition increases the probability of engaging in in-depth discussions radically ($p<.001$)
- experimental students post 2.73 as many messages adding new problem-related information to the discussion ($p<.001$)
- experimental students were 2.95 times more likely to add new ideas for discussion ($p<.009$).
- linking ideas and critical assessment occur rarely. When it occurs, it is in the experimental condition.
Depth of critical thinking at successive stages

- Experimental students show a rather constant level of critical thinking
- Control students show a decrease during problem identification ($F(1, 416)=1408.838; p<.001$) and exploration ($F(1, 415)=1101.513; p<.001$)

Conclusion

Asking students to identify their thinking types by means of De Bono’s (1991) thinking hats significantly promotes
- the overall depth of critical thinking in the discussion
- the critical thinking processes during the stages of problem identification and problem exploration focused, in-depth discussions
- the introduction of problem-related information and new ideas for discussion

Conclusion

Tagging thinking types can be considered as
- a reflection or self-assessment tool for students
- a successful means to foster critical thinking