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Collaboration Scripts – a Conceptual Analysis

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Overview

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2. Problems and Research Questions
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4. What are Characteristics of Collaboration Scripts for Face-to-Face vs. Computer-Mediated Learning?
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Collaboration Scripts as Scaffolds for Collaborative Processes

- Collaborative learning can be supported on two levels:
 - Organizational level: Overall organization of collaborative learning processes (group formation, task assignments, duration, etc.)
 - Collaboration level: Collaborative processes emerging in collaborative learning (roles, activities, communicative acts, etc.)
- Some scaffolds for the collaboration level (Kollar, Plöetzner, & Harrer, in prep.):
 - Prompts (e.g., Davis, 2003)
 - Shared external representations (e.g., Suthers & Hundhausen, 2003)
 - Collaboration scripts (e.g., Weinberger, Stegmann & Fischer, 2005)

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Problems and Research Questions

- Problems:
 - Few theoretical accounts of what collaboration scripts are
 - Literature on collaboration scripts appears to be scattered
- Research questions:
 - What are central conceptual components of collaboration scripts?
 - What are characteristics of collaboration scripts for face-to-face vs. computer-mediated learning?
 - What can research gain when knowledge about face-to-face and computer-mediated approaches is brought together?
 - What are main deficits in collaboration script research?

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What are central conceptual components of collaboration scripts?

- Comparing collaboration scripts with cognitive scripts
- Cognitive scripts: Procedural knowledge that guides our understanding of and acting in particular everyday situations (Schank & Abelson, 1977)
- The „restaurant script“
- Commonalities between collaboration scripts and cognitive scripts → central conceptual components:
 - Objectives
 - Activities
 - Sequences
 - Roles
 - Types of representation

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What are central conceptual components of collaboration scripts?

- A preliminary definition:

Collaboration scripts are „an instructional means that provides collaborators with instructions for task-related interactions, can be represented in different ways, and can be directed at specific learning objectives. These objectives can be reached by inducing different kinds and sequences of activities which are implicitly or explicitly clustered to collaboration roles. Scripted activities can be broken down into single acts that together form a larger activity, and scripts can vary with respect to how much structure they provide“ (Kollar, Fischer, & Hesse, in press).

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What are characteristics of collaboration scripts for face-to-face vs. computer-mediated learning?

- **Collaboration script approaches for face-to-face-mediated learning:**
 - Scripted Cooperation (O'Donnell & Dansereau, 1992)
 - ASK to THINK – TEL WHY (King, 1998)
 - Structured Academic Controversy (Johnson & Johnson, 1994)
 - Reciprocal Teaching (Palincsar & Brown, 1984)

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What are characteristics of collaboration scripts for face-to-face vs. computer-mediated learning?

- An example: ASK to THINK – TEL WHY (King, 1998)
 - Small groups learning text content or content from presentations
 - Two roles: questioner and explainer (incl. multiple role switches)
 - Questioning is supported by „cue cards“ that contain question stems for different question types (e.g., review questions, comprehension questions, thinking questions, etc.)
 - Questions are supposed to be asked in a specific sequence
 - Explanations are supposed to follow pre-specified rules (e.g., „answer the why and how of the question!“)
 - Extensive training in the correct application of the script

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What are characteristics of collaboration scripts for face-to-face vs. computer-mediated learning?

- **Assessing ASK to THINK – TEL WHY:**
 - Objectives: Acquiring knowledge about text content, acquiring cognitive and metacognitive strategies on questioning and explaining
 - Activities: Cognitive and metacognitive activities: summarizing, explaining, monitoring, probing
 - Sequencing: Explicit sequence of question types
 - Roles: Explicit distribution of collaboration roles (questioner vs. explainer), incl. role switches
 - Types of representation: textual (cue cards), mental (through extensive training)

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What are characteristics of collaboration scripts for face-to-face vs. computer-mediated learning?

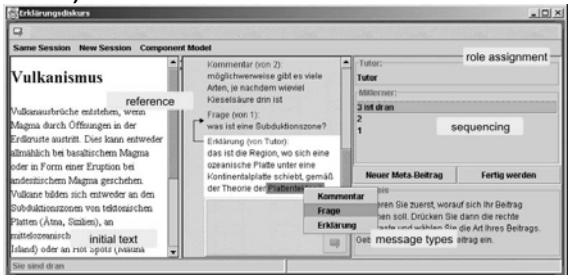
- **Collaboration script approaches for computer-mediated learning:**
 - Baker & Lund (1997)
 - Hron, Hesse, Reinhard, & Picard (1997)
 - Learning Protocols (Pfister & Mühlpfordt, 2002)
 - CaMILE (Guzdial & Turns, 2000)

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What are characteristics of collaboration scripts for face-to-face vs. computer-mediated learning?

- An example: Learning Protocols (Pfister & Mühlpfordt, 2002)



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What are characteristics of collaboration scripts for face-to-face vs. computer-mediated learning?

- **Assessing Learning Protocols:**
 - Objectives: Acquiring knowledge about text content, alleviating communication and coordination
 - Activities: Cognitive and coordinative activities: questioning, commenting, explaining (see message labels); explicit referencing
 - Sequencing: Explicit sequence of turn-taking, no sequencing of types of activities
 - Roles: fixed tutor- vs. tutees-roles; no explicit role distribution among tutees, no role switches
 - Types of representation: textual, graphical & through the interface design

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What are characteristics of collaboration scripts for face-to-face vs. computer-mediated learning?

Summary:

	Approaches for face-to-face learning	Approaches for computer-mediated learning
Objectives	Cognitive, metacognitive („higher-order learning“)	(Meta-)cognitive + communicative-coordinative
Activities	Explicit guidance of cognitive and metacognitive activities	Explicit guidance of communicative-coordinative activities, less guidance of (meta-)cognitive activities
Sequencing	Explicit sequencing	Rather implicit sequencing
Roles	Explicit role distribution	Rather implicit role distributions
Type of representation	Textually, mentally	Textually, graphically, through the interface design

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What can research gain when knowledge about face-to-face and computer-mediated approaches is brought together?

- Research on approaches for face-to-face-mediated learning → knowledge about how to design for „learning enhancers“
- Research on approaches for computer-mediated learning → knowledge about how to design for „interactional essentials“
- Bringing both research lines together can help to design collaboration scripts that support collaboration on two levels:
 - Coordinative-communicative level
 - Cognitive-elaborative level

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What are main deficits in collaboration script research?

- How do the different script components relate to each other?
- Trade-off between effective guidance and over-scripting (Dillenbourg & Jermann, in press)

→ How much structure should collaboration scripts provide?

- Importance of individual prior knowledge about collaboration?

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A Person-Plus Framework on the Interplay of Internal and External Collaboration Scripts

- Conceptualizing learners' individual prior knowledge about collaboration as their „internal scripts about collaboration“ (see Schank & Abelson, 1977)
 - Knowledge about how to understand and how to act in collaborative settings is cognitively represented in the form of (cognitive) scripts
 - Structures of internal collaboration scripts can vary between individuals
- Basic assumption for developing a person-plus framework: Observable collaboration patterns that occur between individuals are partially guided by external collaboration scripts and partially by internal collaboration scripts

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A Person-Plus Framework on the Interplay of Internal and External Collaboration Scripts

- Person-Plus-Surround (Perkins, 1993):
 - Basic assumption: Cognition does not take place solely „in the learners' heads“
 - Basic concepts:
 - Person-plus-surround: The individual together with his immediate social and artifactual surround forms a system that as a whole participates in cognition (e.g., individual + hand calculator).
 - Accessibility characteristics: For a system to engage in a particular task, it is not important, where the knowledge is represented, but instead how easily it is accessible.
 - Executive function: Each person-plus-system includes a metacognitive instance that sets goals and monitors the systems' activities with respect to them

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A Person-Plus Framework on the Interplay of Internal and External Collaboration Scripts

What is required for a person-plus system to successfully engage in a collaboration task?

Activity	Knowledge	Executive function
<ul style="list-style-type: none"> • Objectives • Sub-activities • Sequences • Roles 	<ul style="list-style-type: none"> • Type of representation • Accessibility 	<ul style="list-style-type: none"> • Goal-setting planning and control • Performance planning and control

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A Person-Plus Framework on the Interplay of Internal and External Collaboration Scripts

- **Consequences for collaborative learning with collaboration scripts:**
 - Scenarios in which external collaboration scripts are used can be assessed with respect to how much they allow the learners' internal scripts to guide collaboration
 - The extent to which an external collaboration script provides learners with freedom concerning sub-activities, roles, performance planning, etc. to some extent determines how much of the collaboration is guided by learners' internal scripts with respect to these dimensions.

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A Person-Plus Framework on the Interplay of Internal and External Collaboration Scripts

- **Example: Analyzing collaboration of a small group in the Learning Protocol approach**
 - **Activity**
 - Objectives → highly structured by external script
 - Sub-activities → moderately structured by external script
 - Sequencing → hardly structured by external script
 - Roles → hardly structured by external script
 - **Knowledge**
 - Type of representation → textual, graphical, and mental
 - Accessibility → partially highly accessible in the surround, partially depending on structures of internal scripts
 - **Executive function**
 - Goal-setting planning and control → tutor, interface design
 - Performance planning and control → tutor, interface design

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Conclusion and Open Questions

- Both internal and external collaboration scripts determine actual collaboration processes
- What is the nature of the interplay between internal and external scripts?
 - Additive effects?
 - Interactive effects?
 - Differential effects?
- Effects of fading single external script components?
- Computer-support for online-assessment of learners' internal scripts (Dönmez, Rosé, Stegmann, Weinberger, & Fischer, 2005) → online-adjustment of external collaboration scripts?

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Thank you very much for your attention!

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