

# Requirements Driven Tailoring of a Discussion Support Tool for Seminars

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**Abstract:** The paper describes a seminar scenario in which discussions are supported by a computer tool. With this tool, an active participation of students in discussions can be reached and the results of the discussion can be used for further distribution and processing in a digital format immediately. The features of this tool “Cool Modes” are outlined and the technological framework of the tool is then explained in further detail. Experiences with the tool show the impact of Cool Modes on group discussions in a seminar setting. Finally, perspectives for future use and development of the tool are discussed.

## Introduction

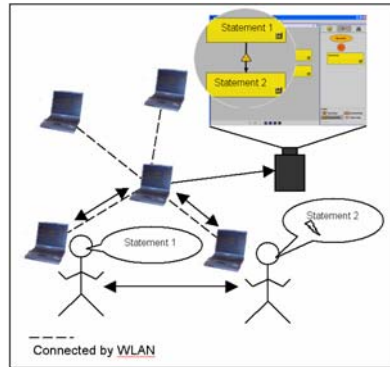
The seminar setting in university teaching consists of a dialogic structure between the participants. Students typically make contributions to more or less complex questions that are presented by a teacher or discuss a presented paper in the classroom. The results of the discussion can be written down by the teacher on a blackboard and by each student on a paper. It is, however, difficult to work on such documents *jointly* in a classroom setting together with other students and the teacher. Furthermore, the results of discussion on a typical blackboard can not be processed in a digital format immediately after the session. Therefore, a computer tool for supporting discussions in a seminar room was developed that students can access by notebooks during the classroom session.

We describe results from the use of notebooks as a discussing tool within three seminars in the context of teacher education at the chair for media didactics and knowledge management, which were held in summer 03 and winter 03/04.

## Cooperative Media-supported Setting

The seminar setting typically is laid out for an active exchange between all participants. This exchange is as well promoted as demanded. In our seminars, students are requested not only to verbalize their questions, suggestions or criticism but also to write them down on cards. Answers to these questions are visualized likewise. This develops a continuous protocol of the meeting. All results are secured and nobody has to fear to miss anything important if one does not take notes. Thus, all students have the time to participate actively in the classroom discussion (Neuland 1998).

For supporting such lively discussions, we explored the possibilities of a computer tool that is installed on all notebooks. One of the notebooks becomes the server during the discussion to save the current session. All other notebook computers take part in the discussion as clients. By this, all students can conveniently generate digital cards that appear immediately on the screen of all other participating notebook computers on the workspace that is shared by the group. The notebook of the lecturer additionally is attached to a beamer. With this arrangement, the shared workspace cannot only be displayed on the screens of the notebooks, but likewise is projected onto the canvas, which facilitates knowledge sharing in the group and building a common ground for the group discussion.



**Figure 1:** communication flow supported by Cool Modes

The cards on the workspace are categorized by coherence and context. This leads to the formation of “clusters” (groups of similar / related cards). Cool Modes enables the visualization of the relationship between two or more cards, e.g. a lightning between two statements shows them being oppositional.

This visualization of the structure of a discussion (spatial arrangement, clustering, relations) allows all participants to get an immediate overview of the complete discussion. With this, redundancies can be reduced clearly and topics not addressed yet are becoming visible. With this arrangement, different points of view can be illustrated very well and the discussion can be focused on a shared ground of concepts. All contributions remain clearly visible and workable throughout the discussion since the cards are categorized and visually structured. Cool Modes supports classroom discussions thereby with following features:

- Cards contain a limited space for the main statement: Thereby, the participants are forced to be brief and precise with their statements. This enables a uniform size for the cards that gives them all the same weight visually.
- Each card also provides space for more detailed explanations: Next to the main statement a text at some length can be added onto the card. For this, the card includes an attachment area that has to be opened up. This feature is especially helpful when the reader doesnot know what the author of a card meant by his statement later after the session. The cards remain closed during the discussion. With this, all cards have the same weight and the workspace remains clearer.
- Spatial structure: The cards can be arranged freely on the workspace. By varying the distance of cards, the proximity between two or more statements can be illustrated spatially.
- Relationship between two cards: Agreement and criticism can be represented visually by connections with corresponding symbols between the cards.
- Voting tool: An integrated voting tool that is easily configurable is very appropriate for evaluating the statements. The votings can be one- or multipoint- questions that are commonly used in the moderation method. In an even-spaced rating scheme, for example, people are forced to take position in a debate because of the missing zero point.
- Role system: Cool Modes does not distinguish roles (administrators, teachers, students etc.) with different rights in contributing to the discussion. Cool Modes does not limit the rights of the participants in any way. This feature of the tool corresponds with the concept of a group of equal participants. The group, therefore, is responsible for organizing their discussion in the face-to-face dialogs. If a student makes a contribution that does not fit into the focus of the discussion or does not conform to the standards of the discussion these contributions will not be excluded with assistance of the software. The group will have to find a way of handling such “disturbances”.
- Chat tool: Additionally, a chat tool can be integrated into the workspace. It can be used to give short explanations to the cards or make moderating interventions. Thus, a scenario is imaginable where the students are located at different places over the internet. But a scenario like this has not been tested here since supporting people in a F2F-scenario was the focus of our research here. Additionally, it has to be considered that the participants might be overcharged if moderating interventions and process directives had to be written down in addition to writing the cards.
- Replay function: After the end of a session, it can be interesting to see how the discussion developed or which statements released or affected others. Cool Modes is equipped with a Replay function which illustrates temporal emergence and change of the workspace.

With these features, Cool Modes helps the individual to reflect one own’s concepts, it forces the individual to articulate one’s positions rather precisely, it supports visualizing statements and helps sharing concepts and

positions in groups „Semantic nets and concept maps are representations of cognitive structure, perhaps crude and simplistic albeit effective in helping learners describe and analyse their knowledge structures. Reflecting on what one knows necessarily stabilises that knowledge, which makes it more useful to the learner.“ (Jonassen 1992, p. 21). In a session, the growing map that illustrates the seminar discussion can thereby be described as “externalised group knowledge”. In the beginning of the seminar the students usually have little knowledge in working with such a moderating tool. They can be designated as “novice” (beginners). Also, our students reported low abilities in learning self-directed as well as working together cooperatively in small groups at the beginning of the seminar. An increase of competence in these areas during the class could be observed.

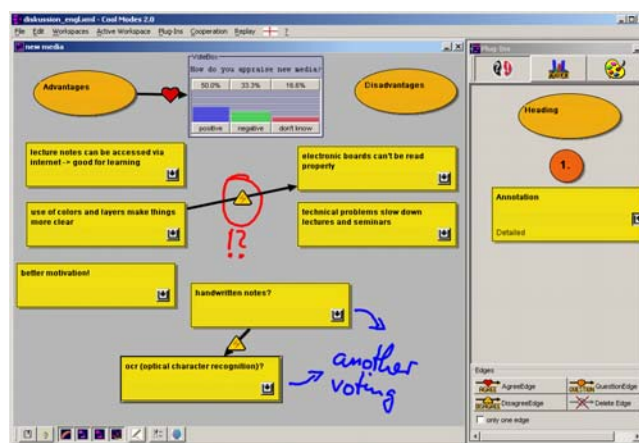
For this, the guidance by the lecturer is stronger in the beginning and a more active moderation of the group activities is necessary in the early phase of the seminar. During the seminar the groups can cope with more and more moderating tasks by themselves. Thus, students search for information on their own and increasingly group members moderate the session on their own. The group is supported significantly by the use of Cool Modes as a computer tool on the one hand and the infrastructure of Duisburg Learning Lab (DLL) [1] on the other hand, which allows moving all furniture freely. Thus, they are able to arrange a situation that support exchange and create a climate for participating actively in the classroom discussions.

## Technical Realisation and Usage of Cool Modes

In chapter 2, requirements for a software tool to be used in discussion scenarios have been presented. A tool that fits most of these requirements has already been mentioned: Cool Modes (Collaborative Open Learning and MODELing System) (Pinkwart, Hoppe, Bollen & Fuhlrott 2002). This tool will be described in more detail in this chapter.

Cool Modes has been created by the COLLIDE research group of the Institute of Informatics and Interactive Systems at the University Duisburg-Essen. It is based on a “shared workspace” environment that can easily be used to create graph-based representations of any kind simply by *drag & drop*-operations. Different types of visual languages can be added modularly with a plugin-mechanism. E.g., there are plugins (called “palettes” or “reference frames”, Pinkwart 2003) to build Petri Nets, UML class diagrams or discussion graphs. Visual languages that can be processed semantically can be simulated and / or calculated directly in Cool Modes. Any visual language can be combined with any other visual language in one workspace. Another more special visual language can be used to create annotations or sketches of any kind: the handwriting palette. Since several Cool Modes applications can be synchronized with the help of a MatchMaker server (Jansen 2003), this tool is suitable for collaborative modelling.

Furthermore, Cool Modes cannot only be used as a modelling tool, but as well as a tool for presentations and annotations. Any kind of content can be prepared in advance to a lecture or seminar to have it presented and annotated there.



**Figure 2:** Discussing with Cool Modes: text cards, voting and handwritten notes.

[1] The DLL has been set up in 2002. See <http://online-campus.net/edumedia/lab/default.htm>

For use in seminars, special features and palettes have been added or modified. In cooperation with the chair for media didactics and knowledge management, a palette to support discussions in seminars has been created with the requirements and features described in the previous chapter.

Another plugin that has been created allows for holding elections or votings of any kind. Figure 2 shows the result of such a voting. Any participant of a synchronized Cool Modes session can configure a vote and drop a voting-node in a workspace to allow others to cast their votes. After this, a chart appears showing the results of this vote. In most cases, votings will take place in synchronized sessions and each participant will have exactly one vote to cast, but other scenarios are imaginable and are supported by Cool Modes. Considering several people using one notebook or having only one computer at all (e.g. for presentations), it is possible to give each instance more than one vote. Additionally, it is possible to hide the results unless all participants have given their votes. This allows for anonymous votings in an easy way. Such votings can be show opinions and positions of learners in a seminar or in a lecture. Knowledge about these opinions can be highly interesting and motivating in the beginning of a discussion or can be used as closing words or as a summary at the end of a discussion.

Cool Modes supports integrating different visual languages at a time and in one workspace. As you can see in figure 2, elements of the discussion palette can be used in combination with a voting node. Edges of different types can connect elements of different languages to create (semantic) associations. Annotating these elements using the handwriting palette is possible at any time. These features turn Cool Modes into a powerful tool for creating graph-based visualizations of any kind. A teacher or a student does not have to choose a specific and specialized tool for his problem or setting. Cool Modes can be used ad hoc and prepares for a wide range of different scenarios without losing its large expressiveness.

Further on, Cool Modes integrates different types of cooperation and group scales over time. It is possible to work alone, not synchronized, and to save results in a private archive. Without changing the tool (but using MatchMaker in addition), you can work together in a small team of two or more learners, possibly using the same files somebody created alone. Working together in larger groups like in a seminar or in a classroom is possible, too, without changing anything. Using web-based technologies like BSCW or portals, it is possible to share results with a larger community that cannot work together as a whole in a sensible way – imagine lectures with 200 or more students.

Concerning synchronous or asynchronous types of collaboration, Cool Modes (in combination with MatchMaker) supports these different types in a flexible way, too. It is possible to have the MatchMaker server running in a persistent state, thus allowing for connecting or disconnecting to a session at any time.

Habitual forms of discussion support like writing on paper cards and arranging them have the problem of loosing information and context after the session. Usually, the cards are put away and stored somewhere – if at all. Sometimes photos are taken of the arrangement of cards. Having these information in digital form (e.g. as a Cool Modes file) stored in an archive with retrieval functions improves reusability of results of a lesson (see Hoppe & Gaßner 2002 and “Perspectives”).

## **Experiences with the Seminars**

As previously mentioned it cannot be assumed that the students bring along competencies in handling the computer and/or the software used here. For this reason, the basal conditions in handling the computer must be created first of all.

Therefore an introduction in the software tools used was given at the beginning of the seminar. These were Cool Modes, BSCW (basic support for cooperatively Work) and a portal on postnuke base that served the exchange of the group between meetings and also can be used as a common meeting place after conclusion of the seminar in sense of a Learning Community respective Community of Practice (Bielaczyc & Collins 1999).

After a short introduction into the tool Cool Modes the groups could work effectively with it because the application is easy to handle and mostly self-explaining. Only the technical connection of the notebook computer to a shared work group for working together at one workspace was a little bit more difficult for most of the students. The setup of the connection was supported step by step by the software, but the students had to know how to get to know their IP-address.

The groups had to learn to save the discussion up to present regularly, too, to prevent an eventual data loss. Software is naturally more likely to break down than a physical pin board. That had to be done partly on different equipment, too.

In summary the experiences made can be claimed as throughout positive. Cool Modes supports in many ways the process of discussing through its features. Especially the digital output of the developed result is a great

advantage compared with the traditional moderation method. With the digital output the result is easier to contribute and with the replay function the development is kept for later investigation. It also can be brought in and changed as a starting point for a new discussion. Altogether there are fewer breaks between media.

Another advantage is the readability of all cards. This should be self-evident, but right here the conventional moderations have a huge deficit (problem), because some of the cards are so badly written, they can't be read afterwards (e.g. at the photo protocol) and are therefore lost for the result.

Likewise advantageous is in fact the ability to access the workspace from all over the world. This way all students can conveniently generate digital cards while staying at their desks, e.g. asking questions, making annotations or state different opinions during a presentation without disturbing the presenter. If the presenter likes he can react directly on one or the other card. Additionally it's possible to talk to experts far away.

On the other hand we found conditions in which the tool reached its limit. The following restrictions could be observed:

- one colour for cards: Colours of cards are typically used for sorting related cards. In the current version Cool Modes, however, cards can only be displayed in one colour.
- limited types of cards: In the currently used version of Cool Modes there are three types of cards available: one for titles, one for numbering and one for statements. Additional forms, e.g. for annotations, explanations or conclusions, would be helpful.
- limited workspace: The shared workspace is rather small. Furthermore, navigation in this area turns out to be quite complicated (with the available scrollbars). On the other hand, a larger workspace would not be worked on easily by several people at the same time. A feature which points out the position of new cards would be helpful.
- use of other multimedia types: It would be useful if pictures, diagrams, animations or complete presentations could be uploaded and arranged freely on the workspace and if the symbols (lightning, heart) could be used to picture the connections between them.

## Summary and Perspectives

The previous chapters showed that one of Cool Modes main concepts is supporting a large scale of different types of learning scenarios in one single tool. This includes integration...

- over different group scales (individual, small group, large group, community).
- over different synchronisation methods (asynchronous work vs. synchronous work).
- over different types of representations / mixing multiple visual languages.
- over the time by supporting a flexible reuse of content.

At the moment, Cool Modes lacks the ability to show who is connected to a session or what the others are doing at the moment. New plugins for Cool Modes could provide users with information about social context, group structure or changes in the content, thus creating different kinds of awareness (group awareness, thematic / content awareness, location awareness etc.).

There are several ways to potentially enhance awareness; some of them shall be presented here:

- A simple chat tool can help people getting to know each other and help to clarify cooperation or simple to talk off-topic.
- Considering workspaces that are larger than the display, a learner cannot see all changes made by his colleagues. A small overview of the workspace with markings on recently changed objects can create awareness on what others are doing.
- A similar intention is associated with a small window that presents actions in textual form. These textual representations of action would be based on log files that are created by MatchMaker. These log files can also be used to evaluate collaboration afterwards.

Another point is the creation of an archive to store Cool Modes files and to retrieve them afterwards. This archive – possibly a database – would automatically store metadata to the files to enhance retrieval functions:

- Who created this file?
- When has it been created?
- Which palettes have been used?
- Which other learners participated?

- What was the problem / task?
- ...

Such a metadata-indexed archive would improve reusability of past results, presentations or discussions a lot. Additionally, this archive could create some sort of thematic awareness (“Are there other results in similar topics?”) or social awareness (“Which other learner do similar things? Could I join them?”). A diploma thesis dealing with this topic has just been finished and will be integrated within in a short time.

A disadvantage of new media simply is the fact that these tools still cannot be used as easily as a classical blackboard or as pen and paper. Time is needed to have computers and applications started, heterogeneous equipment and / or operating systems complicate installation of software etc. Future works will have to consider these problems and will try to make the presented solutions usable more easily and ubiquitous accessible. Important steps have been made in this direction in cooperation with the central service unit [2] of the university. They provide a notebook clusters each consisting of a dozen computers equally equipped with hard- and software that can be borrowed for use in seminars or lectures. Generally, with the massive dissemination of notebook computers on campus the university tries to promote the active participation of students in seminar and lecture settings (Kalz, Stratmann & Kerres 2004).

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[2] AVMZ, see <http://www.uni-duisburg.de/AVMZ/> and eCompetence / KDM, see <http://ecomp.uni-duisburg.de/>