Video communication and the successful handling of complex tasks in remote teams – A qualitative study in a business game design

Robin Luge & Ulrike Starker

Harz University of Applied Sciences, Wernigerode, Germany

ABSTRACT

Complex problem solving in remote teams is already part of many professionals‘ daily work, with collaboration via video systems being common. The extent to which this supports or hinders the processing of complex tasks and how these digital possibilities can be used successfully is the topic of our research. First of all, it is important to identify the relevant variables whose conscious modification can lead to faster and higher quality team work results. In this study, 50 participants were divided into six groups and asked to take part in a one-hour online business game. The work processes were documented by video recording and qualitatively evaluated with regard to communication and work flow. As a result, several hypotheses were generated that suggest an influence of the work organisation, the methods and technical applications used, the communication behaviour, the respective expertise of the team members and the group composition on the work result.

Keywords

Complex problem solving – business game – remote teams – video communication – teamwork – digitalisation

1 Research design

Within the framework of our research question, we chose the following procedure.

We decided to use the complex business game „Fruchtgummi GmbH & Co.“ (Luge, 2020), which aims at the creation of a marketing concept and is designed in such a way that it can also be executed exclusively by using a video communication tool. The complexity of the task, according to the characteristics defined by Funke (2003), resulted from the large number of participants and subtasks (many variables), the need for cooperative collaboration (interconnectedness), the small amount of information provided (intransparency), the time pressure in conjunction with the emotions of the participants (dynamics), and the restrictions associated with budget planning (polytelie).

After groups of eight to nine people each took on the role of a consumer product manufacturer’s marketing team, they were invited into digital meeting rooms. Their one-hour collaboration was videotaped. The results of the group’s work resulted in a presentation, which should contain the following parts:

1. An assessment of the status quo on the basis of an online advertising clip and, if necessary, other information they had researched themselves.
2. He current sales figures, which the groups were explicitly allowed to come up with themselves.
3. The actual marketing concept, which could either build on the existing one or be completely new.

4. A timetable that would allow the campaign to be launched in three to four months.
5. An overview of the expected costs, so that these could still be included in the company budget.
6. If the groups still had time, they should add an analysis of other competitors.

To increase the pressure and dynamic, the groups were asked to hand in a first draft after half an hour.

During the presentations, the other participants took on the role of the company's management board and rated the quality of the concept on a ten-point scale („How would you rate the quality of the concept on a scale of 1 (very poor) to 10 (very good)?").

The simulation was followed by a reflection round and a module for transfer assurance with regard to complex problem solving.During the business game, the participants were able to use all the communication tools available to them.

The evaluation was carried out by two observers who first examined the video material separately and noted their perceptions of the process, the methods and tools used, and the communication. The recordings were then compared and summarized in a structured manner.

Furthermore, a one-factor analysis of variance was used to identify groups whose perceived concept quality differed significantly. Following the method of comparative casuistry (Jüttemann, 1981), their processes were again compared descriptively in order to explain possible differences and to report them in the form of hypotheses.

2 Results

A total of 50 participants took part in the study as part of the online course Work and Organizational Psychology at the Harz University of Applied Sciences and were divided into six groups.

Table 1: Composition of the groups.

	Number of participants	Thereof female	Thereof male
Groupe 1	9	8	1
Groupe 2	8	7	1
Groupe 3	8	7	1
Groupe 4	8	5	3
Groupe 5	9	6	3
Groupe 6	8	7	1
Total	50	40	10

In order to obtain a general overview of the working processes and the procedure in the various groups, it was analysed which subtasks (see above) were worked on and when. Depending on the tool selected, several tasks could also be processed in parallel. This is expressed in Figure 1 by tasks standing one below the other.

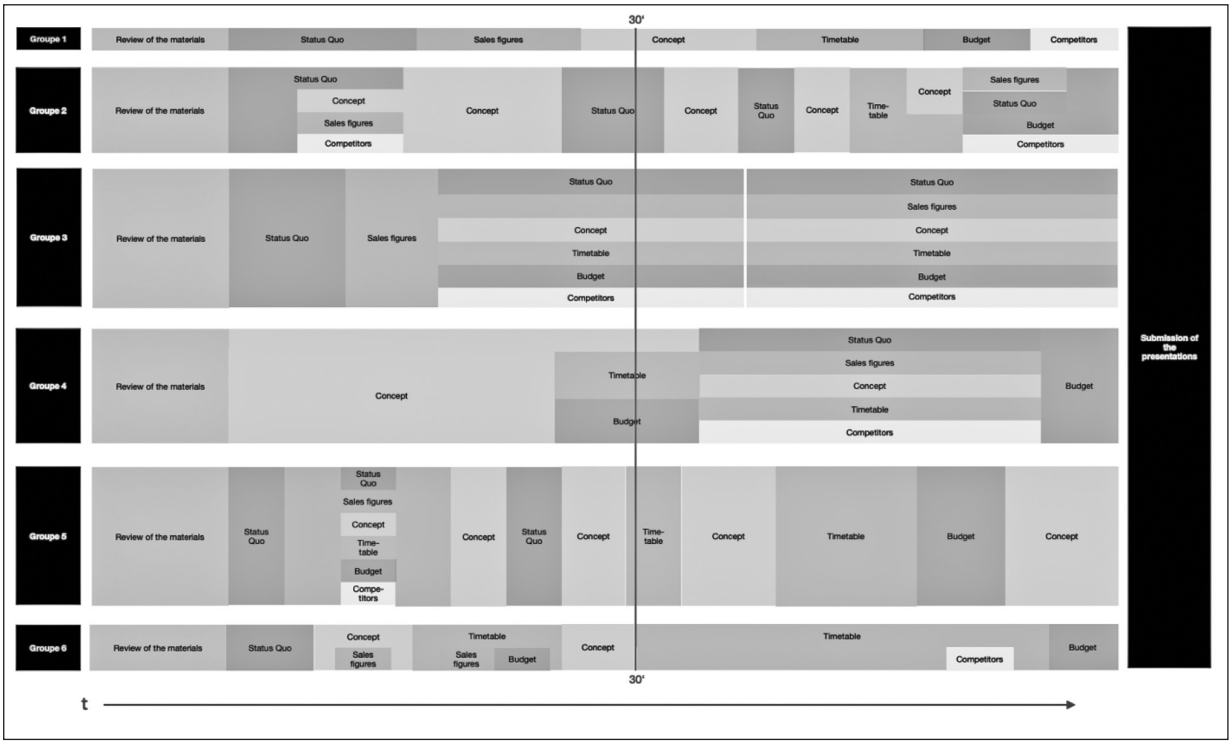

Figure 1: Processing of the subtasks.

Table 2: Work settings in the groups.

	Work settings
Groupe 1	Screen sharing of a presentation (all participants speak, one person takes notes, tasks are worked through one after the other)
Groupe 2	1. Screen sharing of a whiteboard and all participants comment (brainstorming)
	2. Screen sharing of a presentation (one person shares main focus, others work partly in parallel)
Groupe 3	1. Screen sharing (everyone speaks and one person takes notes)
	2. Brainwriting in parallel in a document (shared via file hosting service), followed by screen sharing and discussion
	3. Screen sharing (all speak and one person takes notes, work through the tasks one after the other in the presentation)
Groupe 4	1. Screen sharing of a whiteboard and everyone comments (brainstorming/mind map)
	2. Screen sharing with a split screen: result of brainstorming and a document (all speak one person notes, work through tasks one after the other)
	3. Screen sharing with split screen: document and presentation (shared via file hosting service, one person directs the main focus of the group through screen sharing, others work in parallel on different tasks)
Groupe 5	1. Brainwriting (everyone writes in their own documents, then screen sharing of the result of one participant and additions by the group).
	2. Parallel to the discussion, a partial transfer into a presentation took place
	3. Screen sharing (everyone speaks and one person takes notes, working through the tasks in the presentation one after the other)
Groupe 6	Screen sharing of a document and a presentation (shared via file sharing service, one person directs the main focus of the group through screen sharing, others work partially in parallel)

Notes: Screen sharing means that a person makes their screen visible to all group members via the „Share screen" function.

Figure 1 shows major differences in the order in which the subtasks are processed. For example, group 1 works successively through the subtasks, while group 4 begins by working in detail on the idea generation for the concept. This observation corresponds with the work setting.

Table 2 provides an overview of the respective work settings in which the groups worked on the tasks.

The following results can be summarized from Figure 1 and Table 2.

All groups first reviewed the available material. This took an average of five minutes, with little difference between the teams in this aspect.

The first group immediately began working on the presentation slides, with one person sharing the presentation via „share screen". Only the person sharing could write on the slides. The group worked through the tasks in the order given. Team members discussed several ideas for each task, and as soon as a consensus appeared, the solution was adopted.

The second group decided to first collect ideas on a whiteboard shared via „share screen". All members of the team could take notes through the comment function. The results were then partly incorporated into the further processing of the tasks. The entire group was able to work on the presentation in parallel by using a file hosting provider. Due to the screen sharing, there was a focus on the concept or the status quo several times, while other group members worked on the design of the presentation or other tasks in parallel. After the group had defined the concept and the status quo, the parallel work intensified in the final phase, as some tasks (schedule, budget, competition) still had to be worked out and this could not be done otherwise in terms of time, as the group found out. In contrast to the first group, a more decentralised form of cooperation could be observed here.

The third group started like group one. One person shared their screen with the assignment and wrote down the group's ideas and thoughts on the status quo and sales figures. Afterwards, the group decided to share the document via a file hosting service for everyone to work on. This was followed by a brainwriting phase of about six minutes, in which everyone wrote down their thoughts on all the tasks - including those already worked on in the group. In parallel, a design for the presentation was sought by a group member and then confirmed by the group. After discussing the results of the brainwriting process, the transfer to the presentation slides followed. These were shared via „share screen" and could only be edited by one person.

As the only team, the fourth group started with the creation of the concept for the marketing campaign. By screen sharing a whiteboard and using the comment

function, the group developed a mind map together. They used the 7 Ps of marketing [marketing mix: People, Price, Product, Place, Promotion, Physical Facilities, Process according to McCarthy, Shapiro and Perreault (1979)] to structure their thoughts. They built on the result of their work by using screen sharing to keep the mind map visible at all times (split screen) while they worked on their solutions to the Status Quo and Timeline tasks in a document. Afterwards, the team dedicated themselves to the presentation. In the meantime, the slide design was searched for by one team member and confirmed by the others. Since the presentation could be edited by everyone via a file hosting service, all group members could transfer the solutions or work on the other tasks in parallel. In doing so, they sometimes commented on their approach and drew on the expertise of the group if necessary.

The fifth group decided to first do brainwriting on all tasks in individual work. The results of one participant were then shared via „share screen" and the other group members added their thoughts in the discussion process if necessary. During this discussion, some results were already transferred into a presentation. This was then shared for review by one person via screen sharing. Only the person sharing was able to edit the presentation and the group contributed their ideas on the task currently being shown. As soon as a consensus was reached, the solution was transferred to the respective presentation slide.

Group six decided to work together from the beginning in the presentation shared via a file hosting provider. The screen sharing guided the focus of the team, although individual group members were already working on other tasks in parallel. Since the concept of this group was to introduce a new fruit gum flavour, there were major discussions about the time schedule.

All groups handed in their prepared presentation slides on time and then presented their results to the other groups. The evaluation of the other participants in the business game can be found in Table 3.

With the help of a single factor analysis of variance, it was found that only the ratings of groups three and four differed significantly, at $p < .05$. Following the methodology of comparative casuistry (Jüttemann, 1981), the differences between these two teams will be considered in more detail.

The comparison of groups 3 and 4 in Table 4 shows the following striking differences that could be of importance for the successful generation of complex problem solutions using digital tools in remote teams:

1. The creation of a general collection of ideas at the beginning of the process involving all group members, for example on a common online whiteboard,
2. the consistent further use of intermediate results through visualisation, for example using screen sharing,
3. parallel work using file hosting services,
4. a high number of verbal messages with direct reference to tasks, which should be structured by a moderator and/or with a reporting tool, especially in large groups,
5. a low number of verbal messages with a technical or organisational reference, whereby these can be reduced with increasing familiarity with the software used and through the joint clarification of the procedure at the beginning of the process,
6. a low number of verbal messages without a task reference, whereby it should be noted that no side conversations are possible in online meetings and they can therefore have a disruptive effect on the entire group,
7. task-specific knowledge of individual group members, which seems to find influence more easily when using an online whiteboard or file hosting services.

Furthermore, the following hypothesis can be generated from the fact that all groups used a type of visualisation:

Table 3: Rating of the group performance.

				95 %-CI of Means	
	N	Arithmetic Mean	Standard Deviation	Lower Bound	Upper Bound
Groupe 1[a]	18	8,500	1,200	7,9030	9,0970
Groupe 2	20	8,500	1,573	7,7639	9,2361
Groupe 3	21	7,524[A]	1,601	6,7952	8,2524
Groupe 4	16	8,813[B]	1,407	8,2547	9,3703
Groupe 5	17	7,941	1,144	7,3530	8,5294
Groupe 6	16	7,813	1,109	7,2217	8,4033

Notes: N corresponds to the number of ratings given. Significant differences in the mean values were marked by different indices (Tukey HSD tests, $p < .05$). In group 1, one value was excluded (outlier; 1 out of 10 points).

Table 4: Comparison of groups 3 and 4.

	Groupe 3	Groupe 4
Organisation	• Starts with status quo and sales figures • After consultation on the sales figures, changes the procedure and partially adopts previous results • When preparing the PowerPoint presentation, only one person writes and the others comment • Was not disturbed	• Starts with collecting ideas for the concept • Builds on the results of the previously used method • When creating the presentation, everyone works in parallel and communicates their progress • Were disrupted • Had two people physically sitting next to each other and sharing a camera
Communication	• Verbal messages sent – task-specific: 185 • Verbal messages sent – meta-communication: 149 • Verbal messages sent – without reference to the simulation game: 27	• Verbal messages sent – task-specific: 235 • Verbal messages sent – meta-communication: 114 • Verbal messages sent – without reference to the simulation game: 12
Methods / Tools	• Brainwriting • Screensharing • Use of file hosting service • Presentation and word processing software	• Brainstorming (with mind map) • Screensharing • Use of file hosting service • Presentation and word processing software
Expert knowledge	• No inclusion of theories or schemes	• Marketing mix, 7 Ps
Further conditions	• 7 females and 1 male	• 5 females and 3 males

Notes: Only oral communication was evaluated. Task-specific communication only includes verbal contributions that relate to the processing of a specific task in terms of content. Meta-communication includes verbal contributions on technical problems and group organisation (e.g., division of tasks). The category „without reference to the simulation game" includes everyday conversations that have no connection to the processing of the task.

8. visualisations are advantageous for working on a task with an increased degree of complexity in a group.

3 Discussion

Several hypotheses emerged from this qualitative study that could form the basis of further research.

A limitation of this study results from the measure of success used. On this, see also Funke (2003). The mutual assessment of the group members cannot be described as optimal, but seemed methodologically appropriate for the aim of this study. Sympathies, antipathies or personal ambition can influence the rating, but are negligible due to the reciprocity of the ratings and the generally high number of raters. Furthermore, the personal abilities and skills of individual group members could represent different moderator or mediator variables. This provides another starting point for future research.

In summary, there are indications that under certain conditions, video communication in combination with digital tools can help to improve the handling of complex tasks. These conditions include a planned and careful use of different tools and methods, which should be supported by visualisation. If it is also possible to structure participants' contributions and problem-solving steps in a meaningful way, then the use of video communication systems is not only a real alternative to joint work in presence, but is even superior to it due to the diverse visualisation and structuring possibilities.

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Correspondence to:
Prof. Dr. Ulrike Starker
Harz University of Applied Sciences
Department of Business Studies
Friedrichstraße 57-59
D-38855 Wernigerode
ustarker@hs-harz.de