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Is the writing on the walls for tabletops?

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Abstract. We describe an ethnographic study that examines how low-tech and high-tech surfaces support creativity and collaboration during a workshop breakout session. The low-tech surfaces included post-it notes, flipcharts, and walls. The high tech surface comprised a multi-touch tabletop. Input was either by pen or fingertips. The breakout session comprised four groups using the different surfaces and inputs during three phases: i) brief presentation of position papers and discussion of themes, ii) creating a group presentation and iii) a report back session. During these phases, collaboration and creativity were found to be either restricted or facilitated depending on the physical, technological and social factors at play when using the different surfaces and inputs. We discuss why this is the case, noting how tabletops might not be such a good surface as low tech materials for supporting this form of collaborative experience.

Keywords: Collaboration, creativity, interactive tabletops, workshops

1 Introduction

Workshops are commonplace in all walks of life. They provide an occasional forum for groups of people to talk about all manner of topics, themes, concerns, etc. Typical goals of a workshop include establishing a new area, identifying key themes, and addressing new concerns. In academia they provide an opportunity for both theoretical and practical research. The extent to whether a workshop is successful in achieving its aims, however, depends on a number of factors. These include keeping the participants actively engaged with the topic and making sure everyone has an opportunity to participate and have their say [16]. One method that is commonly employed to encourage more participation and shared understanding from individuals is to break out into smaller groups for specific sessions. These sub-groups are given a specific task to work on, such as the exploration of a vision of a research area. Due to their small size, breakout groups can be more interactive and provide more opportunities for all participants to contribute.

To facilitate participation, a common practice in breakout groups is to provide a variety of low-tech materials to enable people to write their ideas down and then to compile them into a meaningful structure. Typically, these are post-it notes, sheets of papers and flipcharts. The intention is to enable participants to each contribute with an

idea, opinion or question about the topic discussed and to share that contribution with the rest of the group. These are then assembled on a flipchart and a spokesperson for the group reports back to the larger meeting about what was said and what new themes came from the session. In addition, high tech surfaces are being experimented with. Customized meeting rooms that allow participants to write on special wall surfaces (that can subsequently be erased) are appearing. Shared interactive surfaces are also being used in breakout groups to facilitate participation, especially the sharing and organisation of ideas. For example, whiteboards in combination with software mapping tools, such as Debategraph [6] and Compendium [27], are specifically geared towards capturing and representing information for collaborative modeling, sensemaking and argumentation.

But how effective are the different surfaces and tools? Are the new high tech displays and software tools able to support more effectively the mapping of information, and the sharing of ideas and arguments? If so, how? Little is known as to how these new forms of shareable surfaces support group work and collaboration. Our research is concerned with how different surfaces and input methods support the creation and sharing of ideas in breakout groups, where equitable participation was a desirable outcome. We present an ethnographic study that examined how four breakout groups, using different low and high tech surfaces worked together, initially to discuss ideas, then generate themes and finally to present these back to the wider meeting. Our findings showed marked differences between the groups in terms of how the participants approached the high or low tech surfaces, the turn-taking,, how it affected gatekeeping and the level of contribution in relation to the constraints and rules emerged and negotiated when using the low and high tech materials and surfaces. A particular finding was that both the new technologies – the writing on the wall and the interactive tabletop - were found to be the most problematic for supporting group work and the transitions between the different stages. We discuss possible reasons as to why this is the case.

2 Background

Whiteboards have been used in a number of meeting contexts to promote collaboration. For example, Smart boards have been used to support focused meetings around a single issue [20]; ongoing, continuous work across a host of domains [17] or small group collaboration in informal meetings [25]. Various kinds of software tools have also been developed to support different group activities. Compendium, a structured mapping tool, for example, was successfully used in a two-day workshop to model collaboratively NASA's mission control.

An overarching theme among studies of interactive displays is how people approach and appropriate the technology. The importance of this theme is highlighted by field studies showing the significance of inviting cues to an interactive display for its further use [cf.1,4,5,9] and a gap between intended use and actual use of the technology [cf.3,12,14,19]. Most of the shared display interfaces have been designed

to be vertically-oriented, requiring a model of interaction that forces people to work around them in somewhat unnatural and uncomfortable ways [cf.24, 8]. This can make it hard for participants to take over control or for them to hand it over to others. The effect can be sub-optimal communication of ideas and activity progression.

How might more equitable participation and less awkward ways of taking control be facilitated in small groups where there is a need to create, organize and present a group's ideas? One approach is to provide shareable interfaces that are designed specifically for more than one person to use at a time [22]. A particular kind of shareable interface that is receiving much attention is the interactive multi-touch tabletop, such as Microsoft's Surface [15] and DiamondTouch [7]. Shareable interfaces are assumed to support collaboration because they provide more opportunities for equal and flexible forms of collaboration. In particular, multi-touch surfaces can support simultaneous interaction of digital content by all group members. Such actions are highly visible and hence observable by others.

Studies are beginning to appear that provide mixed results on whether collaboration is promoted. Marshall et al. [13] found that the multi-touch tabletop surface supported the more equitable participation in terms of participants creating a design but that it did not affect verbal contributions. Similarly, Rogers et al. [23] found interaction with the tabletop to be a valuable side channel for the contribution of less self-confident or talkative participants. Hence, it is still unclear as to if and how the new shareable technologies support creative group work, in terms of feeling comfortable approaching the technology, knowing how best to use it, and whether it supports equitable participation. Our research is beginning to explore how groups use different surfaces in such settings.

3 The study: Methodology and Design

To examine how low tech and high tech surfaces affect group participation, especially the creation, sharing and organization of ideas we conducted an ethnographic study of an academic two-day workshop on learning, where the organizers had decided to provide four breakout groups with different kinds. The workshop took place in a technologically augmented space, Qspace, an adaptable space with an emphasis on creativity. To begin, we describe our methodological approach, the setting and the way the breakout session was setup in terms of the groups and the surfaces.

3.1 The method

The methodological approach employed in our study was ethnographic, involving observations of naturally occurring activities and semi-structured interviews. The workshop was planned and run by organizers who we were acquainted with but our involvement with the event was purely as participant observation. Hence, we had no say over the design of the breakout groups or the materials used, but observed it through the eyes of those who inhabit it, by participating.

Following the ethnographic approach, all activities observed were considered as 'strange'; no preliminary hypotheses were formed beforehand and no particular feature of use or interaction was given a priori significance. The collected data consisted of field notes, photos, documents and audio recordings from participant observation and semi-structured interviews. We provide incidents, activities and practices within their context, to emphasise that their meaning is properly comprehended within the appropriate social context.

In addition to the two day workshop, the period of designing and planning for the event was also covered by the observation, providing a deeper insight to the aspirations and the decisions between the managers of Qspace and the organizers of the workshop. Access was negotiated and granted at different occasions and with all the involved parties (organisers, managers, participants). The analysis focuses on emerging themes that occurred during the two day workshop.

3.2 The setting

Qspace is a Centre of Excellence in Teaching and Learning (CETL) space, that was created recently as part of Higher Education Funding Council for England (HEFCE) joint initiative between two universities with an emphasis on creativity. The vision of the space includes technologically rich, but not technology driven learning spaces which free teachers and learners from the constraints of the traditional lecture hall and seminar room. It is a space that provides resources –both physical and technological- that can be used in a variety of configurations with the purpose of supporting more innovative creative processes. In that spirit, the space breathes an all white industrial atmosphere where multi-coloured LEDs, curtains, bean bags, projectors, PLASMA screens and moving walls are the main ingredients for a successful creative session. In these terms, it seems that Qspace is a rather untypical space for an academic workshop, especially for paper presentations; on the other hand, breakout sessions can be supported more flexibly by the way the space can be used to support various collaborative activities.

The technology originally situated in the Qspace consists of ten PLASMA screens, twelve projectors mounted on the ceiling and a display interface that controls the lighting, video and audio input and output in the space. For the workshop, an interactive tabletop, a MERL DiamondTouch tabletop, was also installed by the workshop organisers to support one of the groups during the breakout sessions.

3.3 Groups and materials

During initial planning meetings between the managers/facilitators of QSpace and the workshop organisers an explicit suggestion was made to introduce a more 'creative' activity such as building conceptual representations with low-tech materials (clay, polyethylene, cardboard etc), as this would match the QSpace 'owners' criteria of

use[1]. It is also an activity that has been found to be successful in the past for that space. The workshop organisers incorporated this suggestion by providing groups with different surfaces to work on during a breakout session. From their perspective, they were interested in whether and how the different surfaces would affect collaboration within the groups.

For the breakout session that was observed during the study, four groups were created (A, B, C and D), each consisting of 9-10 participants. The organisers assigned one person in each group to initially present the group's position papers in a summarized version as a starting point for a discussion. Each group was given one hour and a half in total to discuss the issues arising from the position papers. The next phases involved them creating a presentation of the main discussion themes as a concept map, that they would later present back to the entire workshop.

Each group was given either low or high tech surfaces to create their presentation. Group A was given both small and large post-its and coloured markers; group B was provide with large sheets of paper and coloured markers; group C was given coloured markers for writing on a special wall surface (that could be erased) and group D was provided with the tabletop that displayed a simple concept map tool they could use to type in their ideas and arrange into a particular structure.

4 Findings

During the breakout session, the groups followed three phases: i) presentation of the position papers and discussion of issue arising, ii) producing a presentation using a concept map and, iii) reporting back their ideas to the whole workshop. A main finding was that collaboration and creativity was either restricted or facilitated at the beginning or transitions between the phases, depending on the physical, technological and social factors at play. Roles, such as scribe, were adopted by or assigned to individuals and were determined to some extent by the kind of surface used. Our findings also showed marked differences between the groups in terms of: how each group approached and appropriated the different surfaces; the turn-taking that took place, the level of participation in relation to the constraints and the rules that emerged and were negotiated when using the low and high tech surfaces.

4.1 Approaching and appropriating the different surfaces

In Group A, as expected the session started with a brief oral summary of the position papers by the assigned participant. But before moving on to the discussion, one of the participants passed around the post-its and the coloured markers so they could start writing their ideas down. The same happened in Group B. After a few minutes of discussion, one of the participants suggested they start working on the presentation

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[1] Before the facilitators allow any activity to take place in the space, they were going through a list of criteria that the activity should match up to some degree. These criteria ensure that the activity is well suited for the space and complies with Qspace's evaluation prerequirements in terms of its funding.

while still discussing the ideas. Although group B did not originally have post-its, they specifically asked for them to help in the creation of their concept map rather than write only on the large sheets of paper. This suggests that they wanted to write their own ideas down first and then move them onto a shared display to create the concept map – rather than try to write them straight onto the paper. It also meant they could move the ideas around which would not be possible if written directly onto the paper. B1 placed one of the large pieces of paper on the floor in the middle of the group and invited the others to start writing on the post-its important issues that arose from the discussion.

Hence, in groups A and B the second phase was integrated to the first, meaning that the groups were discussing and creating the concept map at the same time. In Group A one of the members (A1) commented: *"From the [participant's] presentation [of the position papers] we recognized the general problem area that we were to address. We decided that we should choose some aspects to address more specifically and we did sort of an informal brainstorming (…) For that, each one of us wrote on a post-it [a big gone]one issue or idea about the area (…)"* . The group shared the big post-its and used them as if they were small ones (figure 1a) rather than using them as a poster surface and adding small post-its notes to it. Accordingly, in groups A and B, prior familiarity with the paper-based surfaces resulted in them having no problems writing their ideas on them and then assembling them into a concept map. All of them readily understood that the post-its were intended for writing a comment, idea or question on and afterwards making it public by reading it or sticking it on the chart paper or the wall. Groups A and B also took a photo of their physical low tech concept map and then projected it digitally to the rest of the audience in the report back session.

For group D, however, the participants were not familiar with the interactive tabletop surface for the task in hand (although most were familiar with tabletops) and so were instructed on how to use it. The person who designed the concept map software (D1) explained how to use the interface to create nodes, type text and to build up a concept map. Hence, although gathering around a tabletop to work may seem natural and where groups can 'dive in', the tabletop requires an extra level of effort by the participants to get acquainted with the unfamiliar software tool for creating the concept map. The group also "chose" not to sit around the tabletop at the beginning of the session (see figure 1b); instead they approached the tabletop later on in the session only after they were asked by D1 to do so. It seems, therefore, that the tabletop surface was more difficult to approach and use the software tool to create a concept map together, even though it was simple, requiring a facilitator to draw them towards it.

Group C, likewise did not use the wall surface to begin with but chose to discuss their ideas verbally while a PowerPoint presentation with the main points of the position papers was projected to the wall. Only towards the end of the session did one or two of them approach the wall and write up their ideas. One of the participants comments: *"(…) it was as if we were mesmerized by the screen and the presentation and didn't want to move [on to the concept map task]"*. Moreover, they wrote them as lists of points rather than as a concept map. However, the writing of their initial ideas was

small and illegible from afar. Another member of the group took it upon themselves to approach an adjacent wall and write up these notes more neatly and bigger so that a larger audience could read them.

Hence, the low-tech materials while small and illegible were easier to transform into public display maps than the wall-based writings, simply by copying it into a digital format and then projecting onto the wall. While this option was also possible for the wall group they chose not to do so, but instead used their initial writings to make a different and tidier concept map on an adjacent wall.

Figure 1a. Appropriating the big post-its.   **Figure 1b** Group D sitting next to the tabletop

4.2 Turn-taking

Research on ordinary conversation and interaction with vertical displays [cf.26, 21] has shown how participants monitor the current speaker or user and orient in order to find when it is possible to take the floor. Similarly, the speaker or user can provide for fluent transition by making his/her withdrawal noticeable. This act of turn-taking was found in some of the breakout groups. In all groups, turn-taking was evident during the discussion phase, although the extent of contribution differed between the groups (see section 4.4). In each group, the occasional speaker paused after making his/her point, providing an opportunity for another participant to comment or make another point. Some breakdowns (interrupting the speaker, simultaneous speaking) were also observed but were not seen as out of the ordinary.

However, turn-taking did not occur in all groups during the second phase. Group A, tried to place the post-its on the wall but they did not stick on the surface. They then resorted to writing on the wall. Even though the end result was similar to group C (writing on the walls), the working process was different. The fact that the group worked initially with the post-its, enabled more equal contribution and participation within the members of the group. These were later transferred to the wall in a very active way. In the process of writing on the wall, all members of group A were holding markers and contributed by taking turns, an action which was not observed in group C. In their case, the group split in three subgroups that worked on separate themes and one person from each subgroup was in charge of the writing. There was negotiation between the members of each subgroup about the written content but no

turn-taking took place. A similar situation was observed in group B; one person (B1) was in charge of the making of the concept map during the whole session and no action-oriented turn-taking occurred when using the low tech materials (figure 2a).

An interesting interrelation between these three cases is that group B adopted a way of working that is usually observed in "whiteboard interaction scenarios"[2] despite the alternatives offered by the entry points available both in terms of the space (around the poster) and the materials (post-its); group C appropriated the wall as a big whiteboard (figure 2b) despite the fact that its size could facilitate other ways of work; and group A in a way defied the "whiteboard paradigm" by turn-taking and replaced it with a new paradigm of wall writing. Finally, in group D (tabletop) a pattern of parallel work was observed; four people were using the work area in front of them to type text and create nodes. No turn-taking took place and in a way each participant was making his/her own concept map individually (figure 2c). Moreover, when three of them stepped down, explicitly providing the opportunity to the rest of the group to participate, only one out of the five remaining people took that opportunity.

Figure 2a. B1 in charge of creating the concept map.

**Figure 2b.** The wall used as a big whiteboard.
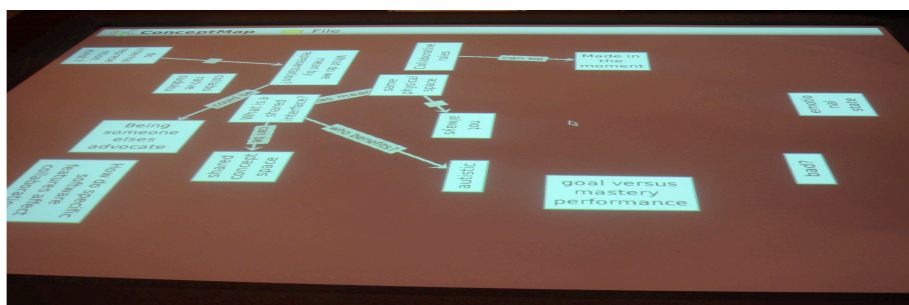
Figure 2c. The directionality of the nodes typed indicates parallel individual work. The nodes that are in the center are the ones created by D1 as starting point.

2 By "whiteboard interaction scenario" is meant the scenario where one person is standing in front of the whiteboard and coordinates or writes and the rest of the group is contributing orally. In such cases, it is possible that some of the group may not contribute at all.

4.3 Gatekeeping

Another finding was that some individuals in a group took control while inhibiting others from participating at various stages. The notion of 'gatekeepers' is used very often in ethnography to describe "*actors with control over key sources or avenues of opportunity. Gatekeepers exercise control at and during key phases (…)*" [10]. Similarly, during the breakout session, some participants acted as gatekeepers of the materials and by extension of the task at hand. For example, in group B, as mentioned in the previous section, only one person was in charge of the post-its and the concept map creation (figure 2a). B1 took over the manipulation of these almost from the beginning of the session by handing out the post-its, suggesting how to work, taking the poster paper and placing it on the floor and positioning himself next to it. In a way, his behavior set the collaboration context for the rest of the session. He implicitly assigned roles to the other participants that were limited to oral and not physical contribution at least in terms of the concept map task. Gatekeeping was also observed in the tabletop group through explicit and implicit expressions. D1, as mentioned previously had programmed the software for the specific concept map task; from that point of view, it was clear that he possessed some level of knowledge on the tool that no other participant could have and in that sense he was an obvious gatekeeper. However, the majority of the group was familiar with tabletop applications in general and could have overcome that obstacle with some initial guidance. This did not happen and other more implicit signs contributed to his being established as a gatekeeper and thus inhibiting some participants from engaging with the tabletop. At some point during the discussion phase, D1 left the group circle and moved to the tabletop where he started typing text and creating nodes for the concept map (figure 3a). As D1 explained later on the interview he wanted to make some examples that would be of use when he explained to the group how to use the software; but, this action, seen from the eyes of the other participants, implied a right, an ownership over the tabletop that the others didn't share. Similarly, during the concept map task, D1's presence and guidance was continuous even when he had supposedly stepped down; he was leaning towards the tabletop commenting, assisting and making sure everything was working properly (figure 3b). Moreover, before reporting back and when everyone from the group had finished working with the task, he 'added some final touches' by reorganising part of the concept map.

Finally, the participants who held key positions during the first two phases of the session (B1, D1), maintained that role in the third phase, the report back session. From this, it is obvious that gatekeeping or the assigned roles were preserved, transferred and extended beyond the physical or digital manipulation of the tools to a higher level of social hierarchy.
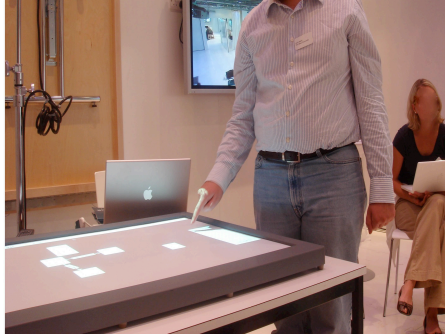
Figure 3a. D1 typing on the tabletop while the rest of the group is discussing.

Figure 3b. D1 leaning towards the tabletop.

4.4 Extent of contribution

The extent of participation can be in terms of oral, written or physical contribution. Some people may not contribute orally but their physical actions in creating a digital or physical artefact can add significant value to the final result [13]. Also, frequent oral, written or physical contributions are not necessarily valuable unless they are relevant to the task at hand. On the other hand, frequency or absence of any type of contribution can prove helpful in revealing collaborative patterns in terms of specific tool use and group dynamics. For example, in group B each participant contributed with at least one post-it but, as discussed in the previous section, not all participated equally in the actual physical activities (i.e. writing and placing the post-its) of the concept map. Also, both from the observation data and from the groups' record of oral contributions (figure 4), it was clear that not all members participated equally in the discussion. Despite the low-tech high-touch nature of the materials (markers and post-its) and the access points available to at least five more people, only two participants were observed to have a leading role: B1 and B2. B1 can be described as the "doer" and B2 as the "talker" based on the prevailing type of their contributions. One possible reason as to why this occurred is the prevalence of gatekeeping. In group A, where no apparent gatekeeping was observed, all members of the group contributed equally when discussing and writing on the post-its and maintained that equity of participation even when the situation prompted otherwise (writing on the walls). In group C, although one participant was in charge of writing and no physical turn-taking took place, our observations indicate that there was constant oral negotiation between the members of the subgroups about the content of the final result. The participant holding the marker neither wrote exclusively his/her ideas nor was a simple listener to the suggestions of others. In some instances the group was even negotiating about details such as the appropriate phrasing and not just the content of the text.

One of the factors that facilitated such high levels of engagement was the small size of the subgroups (3-4 people); it remains uncertain what would be the case if the whole group (10 people) worked on a single concept map. In the tabletop group all members contributed during the discussion. When the transition to the tabletop took

place only five out of the nine people followed; the other four continued with the discussion during the whole session. As a result, the extent of contribution cannot be discussed accurately for the concept map task since four people did not engage at all with the task or the display interface. Also, the participants who engaged did so for a relatively short period of time except for two (one of them being D1) who engaged until the end of the session. It can be argued that the affordances of the specific display did not allow more than four people to work at the same time -although there are ways to overcome this- but, in this case the other four participants did not try to approach or engage even when there were windows of opportunity (three of the participants who were engaged stepped down). One of them when asked later, why, provided a range of reasons: "*I had to move from one area to another and we [meaning the four participants] were discussing… I don't even remember what we were discussing… what I remember is that I felt intimidated and that it [adding text to the surface] is more permanent than the discussion <pause> I also felt more conscious that I was the most junior one*".
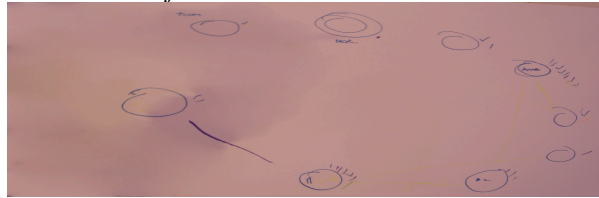
Figure 4. Group B kept a record of their oral contributions during the second phase. The circles represent the members; every time someone contributed, the circle was checked.

5 Discussion

Breakout sessions have become very popular in organizational, educational and academic settings for their enabling small groups of people to focus and work on a common goal usually involving the exploration of the shared understanding and vision of an area. For the breakout session to be successful and benefit the parties involved, it is essential that the participants are actively and equally engaged. As it emerges from our findings -given that the participants are interested in the subject- the choice of the physical setting, the materials (low/high tech) and the planning of the session are crucial factors to the success of the session. Both low and high tech tools have been found to have advantages and disadvantages in terms of enabling active collaboration and equal contribution among the participants. Unquestionably, low tech materials such as post-its and markers have a number of advantages over the high tech interfaces. Paper, for example, is cheap, lightweight and robust [2]. It is also high-touch -people can manipulate and share it easily- and ubiquitous in the sense that no instructions are needed on how to use it. Similarly, Whittaker and Schwarz [28] have shown physical walls to have clear advantages over software tools. However, in their study most of the success of the physical wall is attributed to the fact that it was collaboratively constructed contrarily to the software tool where data was entered and thus 'owned' exclusively by the project manager. This related to our findings; despite

their various advantages, the post-its in group B did not promote equal participation when it came to the making of the concept map. The collaborative pattern is more akin to what happens at of an *horizontal whiteboard* where one person is in charge and the rest contribute orally and not in equal terms (as shown in figure 4, there was an imbalance even in the oral contributions). Again the key to successful collaboration seems to be equal participation and avoidance of ownership.

On the other hand, high tech interfaces such as Smartboards and tabletops have advantages over low tech tools. People can interact directly with digital information and that information is dynamic in the sense that it can derive or be combined with other media sources such as online, real-time information and feedback from the participants. Also, it can be transferred easily and robustly to other digital media; one example from our study is the transition of the concept map content from the tabletop to the wall via the data projector which was the most fluid compared to all the low tech in terms of appearance and legibility.

 Previously, tabletops have been found to support equitable physical participation and group awareness and approach the natural process of group work when collaborative activities are involved and especially when it comes to distributed planning or idea generation tasks [cf. 24,13]. However, the findings from this study suggest otherwise. A closer look reveals some reasons as to why the tabletop interface proved not to be very successful in terms of collaboration. One possible reason is the size of the group. Generally, it is advisable in breakout sessions to keep the size of the groups as small as possible [16]. Larger groups require more time to complete a given task and in a large group, often, only a few people get to have their ideas expressed. An example is from the comparison between groups B and C. In group C, the splitting up in subgroups enabled more equitable and active participation among the members; whereas in group B, the bigger size of the group (9 people) resulted in unequal contribution to the task and cancelled out the possible advantages of using low tech materials. Similarly, in group D, a smaller number of participants that would be able to sit around the tabletop and work together, might have been able to benefit more from the collaborative use of the surface. Even though the tabletop theoretically could support eight people standing around it, in reality such a condition wasn't optimal or feasible; all the tabletop's features that could have promoted equal and active participation did not materialize in terms of the whole group working simultaneously. Also, in the case of the tabletop, splitting in subgroups wasn't possible as there was only one surface and limited time to work on the task.

Another reason for why the tabletop did not promote collaboration seems to be that it enabled gatekeeping. Perceived or implied ownership over a tool, interface or material can act as a deterrent towards collaboration. Although having a facilitator, a compere or just someone who interacts with the display first in order to engage others, have been found to have a positive effect in studies with interactive displays in public spaces [rf. 18,3,5], in this case it was different. It appears that when the task involves more focused, goal-oriented work, the setting is semi public but still formal and the participants are not novices, facilitating should be minimised. Otherwise, it can be perceived as gatekeeping that can hinder collaboration.

Other factors might have also contributed but require further research. Among them the physical transition from the 'sitting area' to the 'tabletop area' -which may have influenced the approaching of the interface- and the 'permanent and public nature of the interaction' as perceived by one of the participants who didn't engage with the task in group D. It is unclear, yet interesting, why this participant perceived the written text on the tabletop as more permanent than for example the written text on a post-it note. Also, the act of writing is private on a post-it and the person can decide whether to make it public or not; whereas in the tabletop it is public from the beginning with the purpose of contributing to group awareness which has been found to improve group collaboration [11]. In sum, although tabletops show much potential for supporting equitable participation for various kinds of tasks they seem less beneficial for group work that involves the transition between idea generation and organization.

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