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GINGAmapping: Conversational strategies in technical support meta-learning for socio-spatial groups

Mateus van Stralen, Marcus Bernardo, Isabel Medero Rocha, and Amelia Barros

Federal University of Minas Gerais - UFMG | Federal University of Bahia - UFBA | Federal University of Paraíba-UFPG | Federal University of Paraíba-UFPG

The article critically reflects on a remote learning experience in a course for Technical Assistance and Support for Social Housing (ATHIS). The objective of this experience was to promote conditions for students to come in contact with and problematise how different concepts related to digital technologies can be appropriated in ATHIS. Based on radical constructivist thinking, the pedagogical framework proposed for the course explored Zoom and Miro platforms to associate two methodologies for conversation and collaborative ideation—team syntegrity (Beer, 1994) and gigamapping (Sevaldson, 2012). The adaptation and combination of the two methodologies—called here GINGAmapping—enabled the students to get to know each other better and work together in a non-hierarchical and co-creative experience. The results demonstrated that the proposed practice significantly contributed to improving knowledge of the studied topics by each participant and allowed the reverberation of individual contributions throughout the whole team. This experience indicates that team syntegrity and gigamapping can be effectively combined to foster simultaneous and integrated work between groups by digital means.

KEYWORDS: conversation, syntegrity, gigamapping, peer-to-peer learning

RSD TOPIC(S): Mapping & Modelling, Learning & Education, Architecture & Planning

Introduction

The *Ginga* is the basic step of *capoeira*, a mixture of a fight, dance, acrobatics and game created by enslaved Africans during the colonial period in Brazil. The main performative activity of the *capoeira* is the *roda*, a group of people standing in a circle to sing and play instruments to establish the rhythm of the dance. At any time, a person can enter the centre to play *capoeira* and engage with other players, regardless of their different levels of experience. Through the active engagement of the participants, the *roda* is established as one of the primary means to learn *capoeira*. In a *roda*, people of all ages and experiences stand in the same position. The circular organisation of the *roda*, the synchronising movement of the *Ginga* and the way of learning through dance and action of *capoeira*, served as inspiration for the development of a learning experience called GINGAmapping, based on the association of team synteegrity (Beer, 1994) and the practice of gigamapping (Sevaldson, 2012).

Faced with the tragic decrease in student participation in online classes during the COVID pandemic, partly due to what has become known as “Zoom Fatigue” (Shoshan, Wehrt, 2022), the research discusses systemic strategies that can be explored in the context of online teaching. More specifically, the article critically reflects on the design of a remote learning experience using digital platforms—Zoom and MIRO—for an Academic Residence in Technical Assistance and Support for Social Housing (ATHIS).

ATHIS has gained special attention in Brazil after the approval of a federal law that ensures the right of low-income families to free public technical assistance for the design, construction and improvement of social housing. An important debate around ATHIS is over the meaning of the terms “support” and “assistance” and their practical and theoretical implications within the notion of “technical assistance” expressed in the text of the Law (Cardoso & Lopes, 2022). According to Kapp (2018), the term assistance indicates an uncritical commitment to the assumption that those being assisted are socially inferior, while support is more consistent with a critical perspective of these relations. Support refers to the idea of a collective undertaking aimed at strengthening the autonomy of a social-spatial group, whereas assistance has a technical and hierarchical connotation. Within this understanding, the course discussed in this paper was developed with the objective of training specialists from different areas to enable

them to formulate multidisciplinary processes for technical support and assistance in architecture.

The present report discusses the pedagogical strategy for the fourth module of this course on ATHIS, entitled "Program, Design and execution in ATHIS, from analogue to digital: Systems, processes and technologies," which took place between October and November 2021. The first modules were taught by adapting the traditional expository methodologies of the face-to-face classroom for remote classes. Despite a significant effort by the teaching staff to prepare illustrated lessons with exciting content, there was low student participation in the first three modules. Since the concept of heterarchy and active participation among the actors involved are central paradigms in ATHIS, the proposed methodology of this last module was to use the digital platforms Zoom and Miro to associate two cybernetic strategies of collaborative ideation that could improve this scenario: team synteegrity (Beer, 1994) and gigamapping (Sevaldson, 2012). In this sense, the proposed methodology was not only intended for collaborative learning but also to provide a strategy for participatory design.

Team synteegrity and gigamapping

Cybernetics and systems thinking have developed over the last decades a series of conceptual tools and ways of thinking and acting that enable us to deal with complex problems and situations. Within this context, team synteegrity (Beer, 1994) and gigamapping (Sevaldson, 2012) are distinct processes developed to integrate distributed knowledge in different ways.

Team synteegrity (TS) was developed by the cybernetician Stafford Beer as a group methodology to provide decentralised, non-hierarchical social interaction capable of dealing with different viewpoints, developing shared knowledge and enabling self-organisation. Beer, best known for the development of management cybernetics, has created decentralising strategies that spanned from the research on biological computers (Pickering, 2009) to management processes for social organisations - applied in private and state companies and even to a whole country's economy (Medina, 2011). The process brings together thirty people for five days and organises them into twelve groups of five. Each person discusses in two groups, intertwining the whole in the form

of an icosahedron (Figure 1a). Additional connections between distant groups are made by the role of the critic, where each participant makes a final comment in the meetings of two other groups (Figure 1b). In each round of discussion, two spatially opposed groups discuss different topics suggested by the participants themselves. The twelve groups meet in six rounds, an iteration customarily repeated three times. During the meal break, an extra informal round can be made, arranging the tables in five groups of six people who together participated in all twelve groups (Figure 1c). Topics are created after an opening question in an initial brainstorming session and then refined into a self-organised, decentralised discussion.

The geometry of the icosahedron is essential in this process primarily because it establishes no hierarchy between the participants, as it has no periphery or distinctions between its parts. Despite other unique characteristics of the icosahedral structure, variations for smaller or larger groups (Truss, Cullen, Leonard, 2000) have been developed to maintain its main properties.

Although not explicitly developed for education, we believe that the structure proposed by TS can give insights into practical ways to enable a decentralised learning environment (Mejía, Espinosa, 2003). Furthermore, in addition to the existing literature on the protocol and its classical application, other TS experiments carried out online were important to reflect on interfaces and collaboration strategies on the internet (Schwaninger, 1997, Cusin, 2005, Bernardo, 2021a). Those experiences showed that TS could be brought successfully to an online context, which has been facilitated by the popularisation of communication tools such as Zoom and Google Meet.

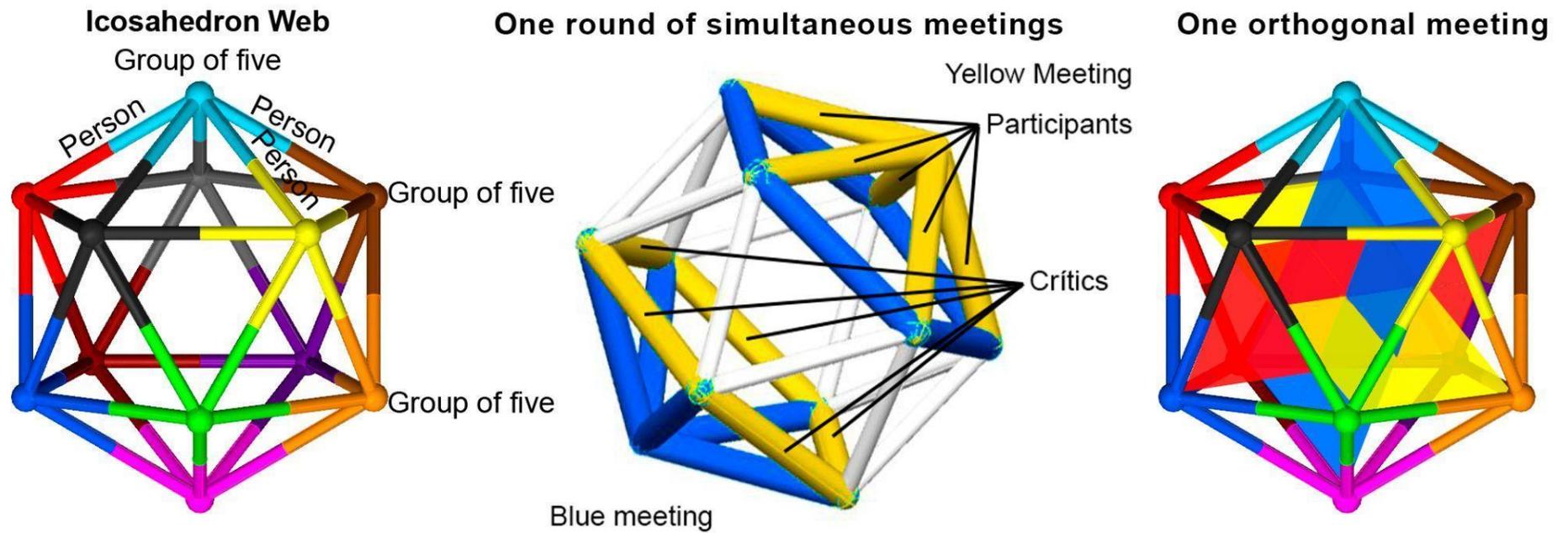


Figure 1. The organisational structure of team synergy. Source: Author, adapted from (Beer, 1994, p.284).

Gigamapping, in turn, corresponds to the creation of extensive visual mapping diagrams developed in multiple sections, layers and scales to investigate the relationships between things, categories and apparently separate fields (Sevaldson, 2011). Similar to other mapping processes based on visual thinking, gigamapping seeks to maintain the complexity and “wickedness” of the problem or situation under investigation without simplifying or “taming” it. The process is generally related to studio work where pen, pencil and markers are used to draw, sketch and write on a large paper surface. Ideally, the map's design is generated throughout the process and has no prior representation or plan. gigamapping is, therefore, a valuable tool to aid conversation as a channel for communication, participation and collective production of information.

Whilst gigamapping can facilitate working on maps collaboratively in a systemic way, TS attempts to ensure that all participants can have an equal chance to express themselves. In this sense, the combination of both processes could create a rich learning environment suitable for online education, such as imposed by the Covid pandemic.

Synchronous and asynchronous conversations via videoconference and text

The central discussion in the experiences studied revolves around the role of conversation in deliberation and collective learning. Conversation Theory is a formal model developed by Gordon Pask (1976) that explains how it is possible for two independent domains - be they people or machines without access to each other's internal knowing mechanism - to be able to recursively express and check their ideas until they agree on a common perception (SCOTT, 2001). The possibility for participants to express, deny, accept and agree (PASK, 1980, p. 999) is a condition for conversations to occur, which can be met by different means of communication, but hardly in a neutral way.

Cusin's experience with TS highlights that collaboration through conversations can be enhanced by asynchronous communication elements. He affirms that face-to-face conversations are vital but not enough as an instrument of collaboration due to their serial and ephemeral character: “participants usually respond to what was said last and after the conversation nothing is left outside their volatile memories” (Cusin, 2005, p.69).

In this sense, text forums and collaborative graphics can help participants remember important topics and weave parallel conversation strands carried asynchronously when most convenient for each.

On the other hand, the form of written conversation can substantially change the content discussed. For example, Cusin (2005, p.62) emphasises that introverts can become extroverts and vice versa in online forums, depending, among other factors, on their ability to write. From our previous experiences with TS, we also perceived that text discussions in groups tended to be more general, theoretical and detached from the participants' daily lives. In contrast, face-to-face discussions brought more personal, affective perspectives connected to everyday examples (Bernardo, 2022).

In addition, according to John Hill (2021), one danger of sharing content on the internet is entering a *platform logic*, which has dominated digital media and has been translating into social organisations. Hill (Ibid. p.155-157) explains that platforms are sharing institutions whose utility is brought by the users themselves. At the same time, their power lies in the ability to provide or deny sharing permissions to these same users. In this sense, Hill (Ibid. p.157-158) states that the TS protocol has an anti-platform logic by focusing on building relationships between participants instead of producing content. In this sense, Hill lists some anti-platform devices of the TS protocol:

1. "there is no position from which all the information is available", thus "no participant can operate as a gatekeeper, since information flows in multiple paths" which "not only interrupts the centralising tendencies of the platforms but also serves to legitimise decisions made through the creation of transparent epistemic communities" (HILL, 2021, p.157)
2. "all privileges, such as speaking or answering, observing and criticising, are equally distributed and maintained on a temporary basis, not entrenching themselves in one person" (Id. Ibid.)
3. "knowledge is maintained by the participants, not by the platform", therefore "there is no cost in leaving a TS" (Id. Ibid. p.158)
4. "reputation is not a requirement for participation and is made less important by individual participation not being visible to the whole group" (Id. Ibid.).

Hill's third point is essential in the context of Cusin's discussion about sharing content, but Cusin (2005, p.70-72) conciliates with Hill when bringing up the claim that collaboration has no value without a purpose to achieve, so collaborative technologies should support the collaborative process more than products. He specifies that this means supporting collaborative relations more than information, individuals, groups or meetings.

Departing from this discussion, a collaboration strategy that would be compatible with the idea of both authors is to associate synchronous face-to-face conversations with asynchronous conversations via text, images and videos. Using graphical interactions as a form of conversation, and not merely documentation, was, in turn, the challenge that led us to the concept of gigamapping.

Interventions on interaction structures—team synteegrity and gigamapping

Mejia and Espinosa (2006) qualify TS as an intervention in interaction structures, which is contrasted with other systemic interventions, like soft systems methodology (SSM) and critical systems heuristics (CSH), where “the perspectives brought into the conversation are re-described through systems ideas” seeking to improve mutual understanding. They also point out that both can be combined, as with more specifically focused critical approaches, such as Freirean. TS focuses on protocolling who and when and gigamapping explores SSM and CSH focusing on how—i.e. the means of interaction. Christine Herr (2014) points to the conversational benefits of “creating activities that do not rely on, and in fact, go beyond linguistic communication” like “model building and testing, site visits, a variety of drawing-based exercises (...) Images and teaching through showing—instead of describing in text” (p. 395). Along with those, this is an intervention that can expand conversation possibilities.

Despite the importance of interaction structures that allow conversations, these structures alone do not guarantee equality of participation (Mejia, Spinosa, 2005). Accordingly, the authors point to the importance of interventions by facilitators to avoid “more subtle mechanisms of exclusion” such as “simply ignoring what a person says” (2007, p.10). As Ben Sweeting (2014) warns, not all conversations, even when best structured, are indeed conversational, they can be dominated using a series of

manipulation mechanisms by somebody who is granted the authority status of a teacher or a specialist (p. 405). Philip Baron (2018) adds to that by remembering that hierarchical organisations are commonplace in society and tend to be mimicked (p. 21). What we add to that, from previous experiences, is that common interaction structures also can be emulated. One example is when students, even in a small group, speak in serial rounds of long speeches that do not respond to each other, like in a timeline of non-related social media posts that speak to a nonspecific crowd. There are many ways by which conversational problems can unfold, which gives this discussion on guaranteed equality an unconcluded state. The way we addressed this situation was to propose conversation itself as a theme for conversation due to the importance of active participation for ATHIS.

Methodology

The collaborative dynamics, which we called GINGAMapping, was divided into two stages: one, asynchronous, which started with the reading of articles and viewing of videos made available by the professors and moved towards the suggestion of contents and reports by the students; another, synchronous, which consisted of conversational dynamics adapted to the digital environment from the TS protocol (Beer, 1994) associated with the gigamapping process (Sevaldson, 2011).

In the first stage, all asynchronous didactic content was organised into thematic groups arranged around a larger circle (figure 2b)—the digital *roda*. The topics were:

1. TS and GIGAMapping—content about the TS process and gigamapping itself
2. Mapping—content on mapping strategies, methods and programs
3. Conversation—introduction to conversation theory and cybernetics
4. Digital Fabrication—introduction to digital fabrication techniques and processes and examples of their use in self-construction contexts
5. Self-organisation—introduction to systems thinking and complexity management
6. Parametric Design and Variety—exploitation of automation to create variety
7. Polyvalence—introduction to Hertzberger's concepts
8. Computing vs Computerization—introduction to different ways of exploring the use of computers in architecture

For every theme, at least one authorial content was posted, be it an existing article or a video produced specifically for the occasion. These thematic videos were created by recording conversations between two of the professors and between them and laypeople.

For each thematic axis, circles were created around the larger circle. These were connected to smaller circles, some already with content related to the thematic axes, others empty, inviting participants to collaborate with more data and information. A preliminary meeting was held synchronously with the participants to explain the functioning of the MIRO platform and demonstrate how they could access video content, texts, images, etc. One of the ideas behind the *roda* is that role of the teacher—*mestre* in *capoeira*—is to create the structure for participation by establishing the rules and rituals for the dance. Likewise, in this first meeting with the students, it was necessary to show them an overview of the proposed process and explain how the experience was to be conducted and what was expected of them.

To organise the second stage (synchronous), two adaptations were proposed: one to adapt the TS process to the number of participants and available time, and another to promote their association with the gigamapping process. For the first adaptation, a stellated octahedron with 24 edges and 14 vertices was used as the organising polyhedron (figure 2c). A particularity of this geometry is that its vertices form two types of groups, internal and external, with, respectively, four and three participants, which can all gather at the same time, reducing an iteration to two rounds. This conformation eliminated the roles of observer and critic, decreasing the interconnection between distant groups. As a way to mitigate this impact, an extra meeting round was created with the characteristics of orthogonal meetings, where three groups of eight people had one participant from each of the eight thematic groups. The critical role of the facilitator was also left out because there were only four professors for eight simultaneous meetings. Therefore, three professors were included among the participants, and one was responsible for helping participants get to their rooms.

To associate the TS with gigamapping, further adaptations were made in the interaction structure and content structuring. The first was to create a spatial diagram on the Miro platform that sought, by reflecting the structure of the SE protocol, to bring its

properties to the dynamics of gigamapping. This was done by projecting the geometry of the stellate octahedron onto the plane inside the larger circle (figure 2b). Its eight points were associated with the large circles of the thematic axes of discussion. Numbers were used aiming to locate the graphical discussions in each group, and arrows with the names of each participant were used to locate the interconnections they should draw between the discussions.

A second adaptation of the TS was to create a table that helped to understand the dynamics schedule and indicated what to do in each round (figure 2a). There were instructions to focus on graphic synthesis during smaller thematic group meetings and on the discussion to connect themes during larger group meetings. Participants continued to have equivalent and symmetrical roles in the structure, each leading an in-group discussion topic from their out-group. A complete iteration consisted of five rounds of approximately thirty minutes, two rounds of discussion between internal groups alternating with two rounds between external groups, plus one orthogonal in groups of eight. In total, two complete iterations were performed, one on the first day and one on the second.

This synchronous step was carried out through videoconferencing on the Zoom platform and the simultaneous elaboration of graphic syntheses on the Miro platform. At the end of each round, participants were automatically taken to their new rooms using the breakout rooms function, previously configured by the facilitator.

On the second day, it was up to the students to propose which themes would be discussed in the dynamics. The eight proposed themes referred to those of the module, but themes discussed in previous modules of the course were also brought up. The following themes were proposed on the second day:

1. Control/uncontrol
2. Local/Global
3. ATHIS beyond the public power
4. Sustainability
5. Autonomy and Heteronomy in practice
6. Conversation interfaces
7. Action strategies in ATHIS
8. Engagement

At this stage of the dynamics, a map of Vila do Amanhecer was placed in the centre and participants were asked to reflect, represent and synthesise which practices, strategies and topics discussed could be explored and taken to the fieldwork with the community.

Results

The results were obtained by analysing both the process, through participant observation, and a form submitted to the students after the experience. The participant observation indicated that the strategy of GINGA mapping favoured greater individual expression, interpersonal involvement and content appropriation compared to previous course modules. The learning strategy proposed in the course offered a structure for interaction by managing groups: organisation and time (who and when) and; space for interaction (how and where). The breakout rooms of the Zoom platform proved especially useful for separating groups in the adapted TS protocol. The use of circles, arrows and numbers proved helpful for the participants to situate the graphical discussion in each group and locate the created interconnections between discussions. The participants added lines and circles when and where they found fit, intervening in the proposed structure. The association of the flattened form of the TS geometry and the circle enabled a non-hierarchic graphic organisation of groups and topics. This

showed that the pre-designed graphical structure did not hinder the participants from creatively intervening on the map.

The introduction of pre-established contents on the first day was essential to catalyse discussions relating the proposed themes to ATHIS. In this process, the participants discussed how technologies usually not associated with ATHIS could be appropriated to deal with the many challenges of working with socio-spatial groups in a heterarchical organisation. In this sense, allowing the participants to propose the themes on the second day was vital for connecting the discussion with the previous modules and relating it to their work on Vila do Amanhecer.

The process of GINGAmapping revealed significant and innovative correlations between themes, as reflected in this synthesis produced by the students: "Technique must be submitted to 'desires' (desire is pre-technical). Parameterisation and computing in the context of ATHIS must be thought of as a technique at service of the desires expressed in co-creation and co-production processes."

As exemplified by this synthesis, the graphical notes arouse curiosity by presenting important research themes but no structured explanations of the covered subjects.

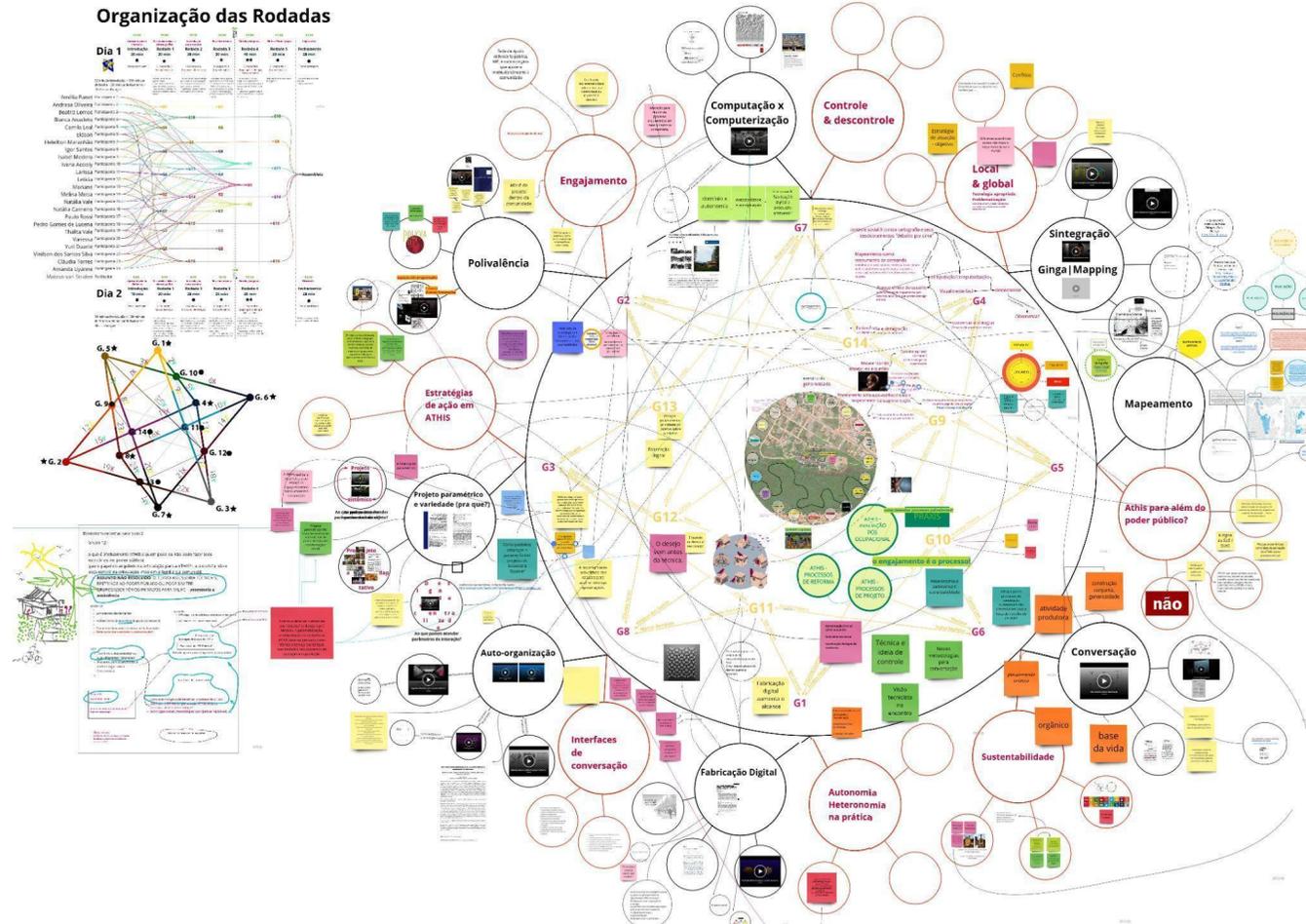


Figure 3. GINGAmapping graphical results.

The form proposed to the participants obtained 16 responses that pointed out, among others, that the conversation:

- significantly changed the participants' impression of their knowledge of each sub-theme (Figure 4)
- allowed them to recognise the indirect reverberation of their ideas in the speeches of others. All responded positively to this question, and some cited very specific remarks they introduced into one discussion and heard in another in subsequent rounds
- made it possible to identify connections between the subthemes; As for the level of connection between the subjects, before the discussions, 40% answered high, 40% medium and 20% low, while after the discussions 86.7% answered high and the rest medium
- was not enough to reverberate ideas discussed by groups on opposite sides of geometry. 86.7% of the participants stated that there was a subject that they saw little in the discussions. All answers indicated the group at their geometry's opposite end when asked which one

All participants also stated that they found it pertinent to use the strategy, or variations of it, in ATHIS.

The students reported that the dynamic offered the first opportunity to know each other and exchange experiences better. It was also noted that the participants opened their cameras in this module, in contrast to previous ones.



Figure 4. Results questionnaire.

Discussion

Learning strategies that explore graphic collaboration and video conferencing platforms were presented in this article. We saw that there is the possibility of combining an adaptation of TS and gigamapping, incorporating strategies to direct discussions to specific contents and predetermining subthemes without defining the outcome. Since collaboration interfaces enable but do not guarantee collaborative work, these two strategic levels of intervention — in the structure of interactions and the direction of content — proved to be essential for managing self-organised discussions for specific purposes and allowing simultaneous and integrated work between groups. In addition to enabling the combination of TS and gigamapping strategies using digital platforms, a relevant contribution of the experience to this discussion was to show the benefits of structuring interaction zones, addressing spaces to participants in graphic collaborations and organising the different moments of interaction between groups and participants. TS alone does not create a space for visual thinking, and the process of gigamapping does not provide an equal space for participation between all those involved.

These strategies are part of an important discussion on how to increase the quality of group conversations and their critical character (Sweeting, 2014; Mejia & Espinosa, 2007; Herr, 2014; Baron, 2018), something that needs to be carefully worked on.

Restrictive interventions can counterintuitively be used to bring more diversity into conversations when they move participants outside the restrictions of reproducing their formal or informal social structures. But restricting socially constructed roles to open space for participants' personal perspectives is a delicate matter.

One strategy, as recalled by Baron (2018), is to use "student references to anchor school curriculum topics" (p.11). In this sense, the experience was able to reference several layers of reflection important for technology: the contents covered, in addition to referring to the very process of interaction between students, would be the motto for them to plan their format of approach to the Vila do Amanhecer community. When discussing this approach, questions emerged as to the plausibility of using digital fabrication and parameterisation tools without harming the active participation of residents. Before taking any technology to the field, it was concluded that understanding the relationships between people would be essential. In this case, the students took their references about ATHIS to deny part of the proposed curriculum when elaborating their proposal.

Similarly, as discussed (Cusin, 2005), the focus on the process, more than the product, contributed to the consolidation of affective relationships between students: each member recognised himself as a fundamental part of this digital capoeira circle and their relationships intensified after the end of the discipline. This was fundamental for the fieldwork with the Vila do Amanhecer community, showing a diverse but cohesive and welcoming group.

An offshoot of the questions raised by the students is the reflection that the conversational strategies used online in this experience can also be adapted to socio-spatial contexts where there is no access to digital technologies. From a systemic perspective, they can be adapted to analogue tools to aid computing, such as boards, abacus, cards, and physical models. As pointed out by Wiener, "every processor is analogue, the analogy is selecting coincidences that are relevant to an eternally unknown reality of functioning. The digital computer is a digital analogy." (Wiener apud PIAS, 2003, p. 158).

Conclusion

The discussion presented in this article points out that the use of the theoretical bases of second-order cybernetics, conversation theory, systems oriented design, and radical constructivism, among others, has the potential to revolutionise the possibilities of parallel and decentralised work that are facilitated by networked digital interfaces.

As a future intention, we propose a review of the organisational structure of the TS variation used in the experiment to avoid the disconnection between opposing groups since this may have been the result of both the removal of the roles of critic and observer, as well as the use of a geometry where the maximum degree of separation between groups is two people instead of one, as recommended by Beer (1994, p.197-210).

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