Supporting Collaborative Project Work in Intercultural Computer Clubs

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Abstract— Situated in schools in Germany, the intercultural computer clubs "come_IN" offer a place for shared computer practice of children and adults. In this paper, we analyze the project work with children and adults in these clubs. Our in-depth analysis of positive and negative effects on two exemplary computer club projects provides us with a set of guidelines that may prove helpful for future project work with children and adults – in the clubs as well as in similar contexts. We also give an outlook on an online community platform called "come_NET" that is currently being developed to even support collaborative project work between the different clubs over their We also give an outlook on an online community platform called "come_NET" that is currently being developed to even support collaborative project work between the different clubs over their location distance. Our case study is grounded in quantitative and qualitative data on project participation, modes of interaction between the participants, description and analysis of the tools used and artifacts created.

Index Terms—Children, collaborative project work, computer clubs.

I. INTRODUCTION

The aim of the "come_IN" computer clubs is twofold: Via computer-based project work in an intercultural as well as intergenerational context, the clubs' participants a) learn to master a tool that has become central in numerous parts of everyday life, and b) establish new social contacts, learn about the ideas of children and adults respectively – within their own and from different cultures. Over the course of one project, which may last from a few weeks up to several months, multimedia artifacts, e.g. videos, animations, and games are being created. In order to support the regular club meetings, "come_IN" aims to establish an online computer club network, (working title) "come_NET" that is dedicated to the "come_IN" club members and aims to connect all German intercultural computer clubs. Therewith, "come_NET" provides a virtual space for the clubs to a) step in contact with other club participants, affording the opportunity for communication and b) share practice over distance, such as knowledge and project data exchange. Moreover, we assume that the exchange and the mutual

support via "come_NET" may affect the project work in the individual clubs positively.

Important structure for the weekly club meetings is a joint opening and final short discussion round, bringing together all club participants to talk about and plan their activities over the course of the collaborative project work. So, on the micro level of weekly club meetings there is a visible structure for the computer-based project work in the clubs.

But not only at the micro level of weekly club sessions can we see influences on success or failure of collaborative project work in the club. Equally important is the macro level perspective on the entire life span of a computer club project. Here, structural patterns are not as easily visible at first sight. It is the goal of this paper to explore and analyze the interplay of micro level club structures and macro level project structures, thus distilling guidelines that are relevant for the successful implementation of project work in the club and in similar contexts.

To do so, we will first give a general introduction on the concept and development of the intercultural computer clubs "come_IN" in Germany, as well as a short outlook on the establishment of the online community platform "come_NET" dedicated to these clubs.

In the following chapter, we then provide a detailed description of the actors' profiles with regard to the two case studies: Who is involved in the computer club, and in what way?

We then analyze the two specific projects. One was carried out in the first "come_IN" computer club in Bonn Nordstadt: the "dino project". The second was carried out in the recently opened computer club in a grammar school in Bonn Tannenbusch. In both projects, children, parents, teachers, and tutors gathered to collaboratively create a virtual board game with the help of the MIT's visual programming language Scratch [5]. We provide a description of the specific club settings and then use the data from field notes that were taken by tutors during club sessions for an in-depth understanding of inter- and intra-group dynamics during the weekly club work over the course of the entire project.

This analysis then allows for a substantiated general view on the macro level of the entire life span of the two exemplarily chosen computer club projects: Several phases can be distilled as being relevant. Our exemplary look on positive and negative effects over the course of the two computer club projects finally provides us with a set of general guidelines that may prove helpful for future project work in the clubs or in similar settings. These guidelines may as well serve as golden thread for the development process of come_IN's online community platform, adjusting and reinterpreting the general guidelines that were derived from

the regular club meetings to an online social networking context.

II. RELATED WORKS

Research on technology mediated interactions circles around three central issues. There is a) a focus on the influence and effect of technology use on (social) human behavior (e.g. [9]): Does it change with the introduction and use of new (computer) technologies? In what ways does this happen? Also, there is b) scientific concentration on technical conditions that enable social interaction and collaboration (e.g. [6], [1]).

How and to what extend does technology open up new possibilities here, or strengthen existing ones? Other researchers concentrate c) on the technologies themselves, looking into the development of new applications and projects (e.g. [2]).

Intercultural computer clubs "come_IN" enable a view on all three issues in one context, focusing on the interdependence of technology, its use, and patterns of social interactions.

Regarding to the development of "come_NET" as an online community for the intercultural computer clubs, our work in this field is also informed by research on dedicated online community platforms, such as discussed by Stanoevska-Slabeva [14] and Thomas [17].

III. COME_IN COMPUTER CLUBS

The concept of the intercultural computer clubs "come_IN" has been developed within the tradition of computer clubhouses [8], [12] in the US and around the world. Since the first club was opened in Boston in 1993, the clubhouse concept with its principles of situated, collaborative learning and constructionist thinking has opened up many new opportunities for disadvantaged inner city youth [6]. The structure and success of the computer clubhouses is well documented in research [3].

With the establishment of the intercultural computer clubs "come_IN" the US computer clubhouse concept has been developed further and applied to issues of inter-generational learning and the integration of migrant communities. Where the US approach has a strong focus on the strengthening of individual skills and thus opportunities [9], the "come_IN" concept concentrates on community dynamics and the strengthening of social ties – on the local family, school and neighborhood level [13]. In order to best serve these structures, it is a needed endeavor to analyze how these social dynamics play out and may best be built and supported during project work in the clubs.

A first "come_IN" computer club was opened in Bonn Nordstadt in 2004, broadening the clubhouse concept and applying it to a German context [16]. Here, the intercultural computer clubs "come_IN" are usually situated in primary schools. They offer an openly structured place for shared practice of children and adults. In culturally diverse neighborhoods this brings together people of different migration background: Once a week they voluntarily gather in the club, work on joint projects or realize individual ideas with computers, study and play. The projects to be developed and the related activities to be performed are collectively decided on. Previous experiences in the clubs include small magazines, video films or Scratch projects

Via computer-based project work, the club members can establish new social contacts; learn about the ideas of children and adults respectively – within their own and from different cultures. Thus they can actively develop a new understanding of the neighborhood and their own share in it – an understanding that may be seen as a crucial step towards integration.

Basic rule for the computer clubs' weekly meetings is that every child should participate together with a parent. Since this rule was not applicable to all children's family backgrounds, those who could not participate together with a parent (because parents had to work during club time), were encouraged to join "come_IN" together with another adult family member or friend.

The transferability of the "come_IN" concept was tested with the establishment of the second club in Siegen in 2006. Here, social and technical aspects of the "come_IN" concept have been refined by a) establishing an opening and final short discussion round, where club members talk about their current and prospective activities, and b) allowing a more flexible way of playing and working by retrofitting the club equipment of stationary PCs with mobile laptops and wireless LAN. Four new "come_IN" computer clubs were founded in summer 2009, among them two clubs in a school complex in Bonn-Tannenbusch with primary school, secondary modern school and grammar school on one site, and a computer club that is rooted within existing structures of voluntary community projects in the Nordstadt of Dortmund.

The paper will focus on two exemplary projects: One in the first club in Bonn Nordstadt and one in the recently opened Bonn Tannenbusch club in the grammar school.

IV. THE ACTORS' PROFILES

This chapter focuses on the different types of actors and their roles in the functioning of the project work in the two clubs of study. The actors in these two clubs are typically either somehow connected to the school that houses the club – though at least in Bonn Nordstadt that is not a set rule at all – or researchers from the university. They can be categorized into four groups: children, parents, tutors, and teachers. As their responsibility in the club grows over time, some participants can be argued as transitioning from one group into another, acting in a different role. This transition over time is smooth and roles adapt to circumstances.

A. Children

The children are central to the activities in both clubs. Their role is to decide together with all the other actors about the current activities and future projects, as well as to proceed with their individual parts within the bigger collaborative project. Their focus is on the creation of personally meaningful artifacts, embedded in the broader project topic

or theme. Within their individual parts, the children create animations, games, videos, photo collections and photo stories, websites and other multi-media artifacts.

Apart from working on the project, children spent a considerable amount of their time doing completely unrelated things they like, e.g. playing browser games, surfing the internet, searching for pictures or writing letters to friends.

Typical activities in the clubs involve playing, exploring, trying out, drawing and painting, writing, taking pictures, searching the internet and programming as well as interacting with other children and actors to exchange ideas, guidance, and help among each other.

In Bonn Nordstadt, participation in the club is completely voluntarily for children and parents. This club, although housed in the school's facilities, is disconnected from the curriculum and part of the neighborhood's after-school activities. It is theoretically open for other interested people from the neighborhood as well, though few are taking advantage of this opportunity. Thus, the children are typically pupils at this primary school and are aged between six and ten. The average age was 8 years old. Former pupils (eleven or twelve years old), who now attend secondary school, occasionally come by to visit the club. They will then sometimes work on individual projects as well or they often also take the role of tutors and help the younger children with their problems. Additionally, the voluntary basis for participation leads to some fluctuation of the members.

In contrast, the (relatively new) club in Bonn Tannenbusch is part of the school's curriculum and its "traditional" branch, which may be chosen by all children who do neither want to be in the schools music, nor in its sports branch. Pupils studying the traditional branch have to take part in the club every week – it is compulsory. The computer club is something special to the traditional branch – as are competitions to the sports branch and concerts to the music branch. Accordingly, the children perceive participation in the club as "their special thing" and do firmly insist that no similar project will be offered to the children in the classes of the music or sports branch: "For this would be really unfair!" The attending children are all pupils of the same class in sixth grade, and are around the age of twelve years old.

B. Parents

The role of the parents primarily is to accompany, help and guide their children and possibly the other children as well (although that rarely happens), in order to facilitate progress within the clubs' projects. Within that role, they provide ideas, problem solving techniques, as well as encouragement and support to the children. Apart from that, they also help in planning and organizing activities, discussing and breaking them down in smaller parts and pieces. Additionally, parents provide an outreach of the clubs' activities outside the normal club hours and into their children's everyday social life and identity building.

Activities of the parents range from observing their child (sitting beside them, watching) to giving hints and helping them. But they also engage in individual projects like learning how to do image and video editing or searching the internet and creating websites. Additionally, within their activities they interact and collaborate with other parents,

teachers or tutors in the club – discussing or just chatting.

Over time, parents may transition into the role of tutors, where they extensively also help other children or the clubs' progress as a whole – maybe even after their children have left the club already (e.g. going to another school).

While there is a rule that a parent or other close relative should accompany a child, this rule is currently not at all enforced. Thus, parents are coming more or less voluntarily to participate in the club. Their presence permits to improve cooperation and integration of parents into the education and learning process of their children [15]. The parents are typically only coming if their child is coming as well.

Families from the Bonn Nordstadt neighborhood have very diverse backgrounds in terms of education and social status. Occupations of the parents in the club include housewife and mother, store cashier, people in the IT sector, teachers and police officer.

Parents in the Bonn Tannenbusch club come from similarly diverse educational and social backgrounds. Similar to the neighborhood population structure, where people from about 120 countries live and every second person has a migration background, the percentage of families with a migration background in this club is high. Their overall social status and living conditions are relatively lower than that of the families in Bonn Nordstadt. The average income of families in Bonn Tannenbusch is less than half the amount of an average family income in one of the other neighborhoods in Bonn; the unemployment rate is above the average of Bonn.

C. Tutors

The role of a tutor is taken by people from two different backgrounds: On the one hand, these are people from the neighborhood who have a genuine interest in the existence of the club and are in some way connected to it (e.g. parents of former children in the club, a spouse of a teacher). Occasionally, one can count some former children who return to help other children to this group as well. On the other hand, these are researchers from the university, who are not necessarily from the neighborhood, but have an interest from a research perspective.

The tutors provide technical help for children, adults and teachers when needed. They offer guidance for the development of new ideas and facilitate the organization of new projects and the club as a whole. The tutors and teachers are typically the first people asked when problems arise. Their activities often include co-moderating discussion rounds, roaming around the club to see what is happening and especially helping children and parents at their individual computers with technical or creative advice.

In Bonn Nordstadt, over the course of the "dino project" nine tutors took part, of which only one was female. Six of these tutors were from the university (Master and PhD level students) and three were people (adults) from the neighborhood. Additionally, two former children in the club stopped by several times to propose a specific course they could teach at the club.

The tutors in Bonn Tannenbusch consisted only of tutors from the university – almost the same as in Bonn Nordstadt. In total, there were six tutors of which only one was female.

D. Teachers

Only one teacher is assigned to each club at a time. The teacher takes a big part of the responsibility and also manages the relation with the school. S/he additionally has a stronger pedagogical perspective on the club's activities and especially more experience in working with children. Apart from that his or her role is similar to the tutors, in that s/he provides help for children and adults when needed and offers guidance for the development of new ideas. Though, his or her part is to a lesser extent focused on technical questions (concerning infrastructure and the programs used) but more on topical and content questions.

E. Participation

In the Bonn Nordstadt club, 17 children participated in total over the course of the "dino project" of which eleven were male and six female. Five of the 17 children had a migration background. Nine parents were present in total of which five were male and four female. Only one parent with a migration background participated at the time. On average three children, two parents, three tutors and one teacher participated in the twenty clubs sessions during the project. At most there were seven children and five parents in attendance, and two children and no parents the least. There are typically less parents than children, i.e. not every child is accompanied by one of his parents. Thus, the overall participation (rate) during the "dino project" compared to earlier projects at the club was not very high.

In the club in Bonn Tannenbusch, twelve children and ten parents participated over the three-month course of the project. On average twelve children, four parents, three tutors and one teacher was present at any given club session. At most there were twelve children and five parents in attendance, and eight children and one parent the least. Again, not every child was accompanied by a parent or other relative. Thus, the "games project" saw a relatively high participation rate.

V. Come_Net: A Dedicated Online Community Platform

In order to connect all German intercultural "come_IN" computer clubs over their location distance, the development of an online community platform called "come_NET" is in progress.

The idea of connecting the clubs on social, as well as on technical level, by providing a virtual place for communication in general and fostering collaborative project work between the different intercultural computer clubs, has been the main incentive for the establishment of the online community platform "come_NET". One benefit that emerges from utilizing this application, relates to the establishing of relationships between clubs. and is no longer limited to the neighborhood, but extended to locally afar computer clubs.

Supporting the exchange of project data, is a) pre-requirement for collaborative project work, b) may foster the emergence of specific roles with regard to certain topics, for instance people specializing in certain domains, such as picture editing or becoming experts in programming with Scratch, c) supports joint brainstorming to develop new project ideas and d) may trigger the re-use of artifacts, which constitute the outcome of the participant's ICT use.

Next to the aspect of facilitating communication and thereby supporting project work, "come_NET" future prospects consider the already mentioned growing independency and self-confidence of participants by transporting the real club meetings project work onto the virtual sphere of "come_NET". Therewith, the platform provides the opportunity for computer club participants to work on projects beyond the regular club hours. Moreover, platform based project work may foster the establishment of certain tutor-/expert-roles on "come_NET", which are demanded by inexperienced users in order to be able to work remote from the regular club.

VI. Case Studies: Game Creation in the Clubs

In the following section we present a detailed description of the two game projects that are in the focus of our analysis.

A. The Dino Project

The so called "dino project" came to life in June 2008. There was no current group project going on and summer holidays were imminent. During this club session's final discussion round, one of the children announced his wish to create a project featuring a dinosaur videogame. The game should be jointly developed and afterwards played by all participants. Everyone present did like the idea and it was decided that the new project should start right after the summer break.

A poster advertising the new project was created by a tutor in cooperation with a parent, in order to maintain awareness of the club's activities during holiday times, when the club suspends his activities.

Most participants in the club did not have programming experience, or could cope with requirements that regular programming environments demand, nor had experience working on virtual games. Thus, for technical practicability and required programming skills, tutors suggested realizing a virtual board game (Fig. 1a) instead of 3D or scrolling application, which the children had planned hitherto. The concept of a board game was also much more familiar to the participants, featuring regular spaces and some kind of "action spaces" leading to certain actions or triggering certain events.

In our case, these spaces on the game's meta-board redirect the player to one of the individual participant's projects that have to be traversed all, racing against other challengers by rolling (virtual) dice.

A tutor proposed to utilize Scratch for the designing and programming task. This choice was obvious, as most participants already got acquainted with this programming environment in earlier projects. Also, most tasks would be possible to accomplish utilizing Scratch alone.

In the first session after the summer holidays participation in the club declined, foremost due to the fact that several participating children, including the one that had initially brought up this topic, had left primary school for secondary

school and were not able to visit the "come_IN" club on a regular basis anymore. Nevertheless, the project had been commonly voted for and project preparations began. Tutors conferred with each other, then drew a mockup of a track design, which was introduced to the children as inspiration for their track on the game board.

One child and her mother joined the club's sessions after summer break, but did not really get involved in the "dino project's" work. That might have been for their joining up a running project, which none of them had initially voted for or had the chance to channel it in a personally meaningful direction. Aggravatingly, the girl had just joined the first grade and her young age and lack of experience in utilizing Scratch manifested in her personal reluctance working on exhaustive projects over weeks. She preferred to engage in other activities that she usually pursued on her own, while her mother was introduced into video editing by another tutor.

In order to meet these problems, the teacher brought up the idea to expand the project, doing a joint excursion to a local museum that featured an exhibition on the theme of "Ice Age". Exhibits included dinosaur relics as well, and the trip should produce new material to process in the dino project afterwards, in order to establish a common basis with the former participants. As joint excursions are always judged by the participants to give great variety to the regular club activities, the trip was accepted immediately.

Contrary to expectations, the project could not gain momentum from this trip, but to the contrary, kind of split participants in two opposing camps.

The first camp consisted of original "dino project" participants, having commonly voted for the virtual board game before summer break. They were pursuing their design ideas in Scratch, being able to integrate new material from the excursion into their individual projects easily.

The second party constituted of people that newly joined the club after summer break. Subsequently to visiting the exhibition, in the club they found all participants, readily engaging in Scratch programming, which had been planned, commonly decided upon and started previously and therefore did not show any connection to the newcomer's personal background. Of course did the new participants share material and impressions from the same joint excursion, but due to the lack of experience with computers, the girl had to start by learning how to use the mouse, type on the keyboard, and doing other essentials before she would be able to try out Scratch. This implies that she had to be guided for the most time by her mother or a tutor. Her mother chose to let her do typing exercises, by adding short descriptions to photos, while the dino project was developed concurrently.

Remaining participants were two children, one accompanied by a parent. They started working on the new project, jointly brainstorming how to realize their individual step on the virtual Scratch play board, in order to turn out most challenging for their prospective players.

Three individual games for the collaborative dino game resulted from these efforts:

1) *Schnucki-Dino*: In this regard, one boy came up with a design resembled by the stage set of the TV show "Who wants to be a millionaire" (Fig. 1b). His individual project should feature a dinosaur quizmaster asking three tough questions that the players would have to answer correctly in order to proceed in the game. He was eager that his work in progress was not spied on by his friend sitting next to him. Still, this did not prevent him from holding a spontaneous presentation for all attendees in the club, when finally managing to get a coded animation to work properly. At other occasions he could be observed leaving his workspace in order to judge on his friend's project, providing him with helpful hints as well.

2) *The Flying Stickman*: The second participant chose a different approach. He managed to rebuild three stages resembling a jump and run browser game that had been popular among children in the club at this time. This game's challenge was to guide a stickman through a stage without touching certain boundaries (Fig. 1c). If these were touched, the stickman would be reset to the level's starting point. Later levels increase difficulty by narrowing the space that the player has available to maneuver the sprite towards the exit door that leads to the next level. He preferred to do all design work on his own, and during his first project consulted tutors and parents for coding issues only.

3) *Dinosaur Race*: As the project proceeded, the participant who had created the stickman game declared this game to be finalized, but found other children still working on their games. Hence, he decided to start another game project. He conferred privately with his parent about its design and accepted a tutor's proposal for a perspective that was easier to draw. This time the "action space" should send players directly to the starting line of a dinosaur racing game (Fig. 1d). The game comprised of one track, featuring two dinosaur racers that could be steered via keyboard. In the design process, the boy managed to reuse the query that monitors if a player's sprite interferes with certain areas of the painted stage. In this example, in case a player leaves the proposed track.
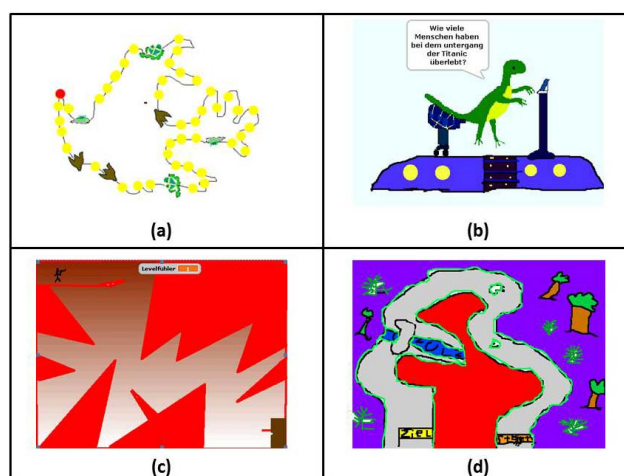

Fig. 1. "Actions spaces" in the virtual meta-board (a) redirects players to the individual participant's games "Schnucki-Dino" (b), "The Flying Stickman (c), and the "Dinosaur Race" (d).

B. The TABU Game

The "TABU game" was developed as the second project of the newly founded computer club in the TABU grammar

school in Bonn Tannenbusch. Unlike the "dino project" in Bonn Nordstadt, it did not actually start as a common project of the entire club but developed as such over time.

Just having completed a photo project with pictures taken at a school trip, children and parents in the club were in search of something new for them to do. Some children in the club had grown fond of working with the MIT's visual programming language Scratch, others were bored with it, because they did not see what else – besides things they had already tried out in the photo project – they could possibly do with it. As a result, various smaller projects came to life. Some children again worked on pictures, exploring the image editing software Gimp. Others started little game creations in Scratch: a soccer game for two opposing players that one boy created with the help of one of the tutors, served as a starting point for various other games involving competition and scores. Various children took the soccer game as a "master template" for them to copy and personalize.

Even so: Some discontentment remained – children were pleased with their individual projects if those went well, but were easily frustrated if problems occurred. Additionally, they voiced a lack of something common for the entire club. So, discussion about a topic for a common project dominated in the opening discussion rounds. As children could not agree on one thing, and were also not all too used to moderated discussions yet, one of the mothers, who regularly participated in the club's sessions, intervened in one of the opening discussion rounds. She proposed the idea to continue working on the individual game projects, which most children were involved in by then, but to unite all these single games to one large board game of the entire club afterwards. This was agreed upon. Children were especially fond of the idea to compete against each other in the club on who would be able to complete all games best.

Even though this decision on a common project did not change much in what was done during club sessions, it did change the atmosphere completely. Like before, children worked on their little individual games – but unlike before, they did so with a new concentration, maintaining a focus and sometimes even forgetting about their club sessions pause time. The mother, who had suggested the collaborative work, continued her coordinative doing by taking up the task to create the meta-board that later would unite all individual games into one. Her daughter joined her in this job. They first collected everybody's game ideas in a paper list and then collaboratively worked on the creation of the game board in Scratch. Collaboratively they created an underwater world, where the player moves along, entering the different individual games via different "entrances". Mother and daughter designed those to match with the topic of the respective game.

Meanwhile, various game projects of the children reached completion – every finished game was immediately and eagerly tried out by the children. Also, the final discussion rounds served as a first audience for the children to show their game creations. The collaborative game work with Scratch triggered the children's creativity, so that some even started a second little game project, right after their first one was finished and found to be good in play.

Individual games that are part of the collaborative board game are:
1) a soccer game for two players
2) a fish game, where a big fish has to eat as many little fish as possible in one minute
3) a Spongebob game, where two Spongebob-figures have to compete in catching balls
4) a key game, where hidden keys have to be found
5) a street game, where a fight against some evil characters has to be won
6) a dressing game, where characters can be dressed with different clothes and hair styling
7) a labyrinth, where bombs have to be placed correctly in order to find a way
8) a jungle game, where the player has to jump from stone to stone not touching the ground.

As the game project neared completion the children engaged in planning the final competition on who would be able to complete all games best, discussing, whether the winner would receive an award, and if they should keep an all-time record of high scores.

VII. Comparative Discussion

Even though they followed a rather similar approach, creating a collaborative board game consisting of several small individual games, the two club projects developed in very different ways – for the dino case very much relying on the tutor's doing, for the case of the "TABU game" developing a dynamics of its own.

A comparative look at intra-group and inter-group social dynamics that established during the two projects sheds light on this important difference. Those intra- and inter-group social dynamics developed among the various types of actors in the clubs (children, parents, tutors, teacher), i.e. either interactions within one group of actors or among two or more groups. Those have to be seen in close relation, inter- and intra-group dynamics affecting each other, and determining the progress of the entire project.

A. Dino Project

In the "dino project", six particular inter-group social dynamics have been recognized.

Noticeably, tutors fulfilled various tasks over the course of the project. First of all, they assisted the children during their programming activities in Scratch, including tasks such as helping to find pictures via online searches or the editing of those, utilizing the image manipulation software Gimp. In doing so, they do not just act or are treated as teachers by the children; rather they are urged to get involved in the gaming sessions as well. With regard to the newly participating girl, tutors also had to invest a great deal of attention that at worst was not at the remaining participant's disposal. Interaction of tutors and parents took place on a different level that was technical and computer-related, but had no connection to the "dino project". This involved help in the use of video-editing software and the solving of general hardware problems.

Interactions of tutors and the teacher took place on a structural level: Tutors helped the teacher to take measures in

order to attract new computer club participants. These measures resulted in a poster that advertised the "dino project".

Interactions between children and teachers, children and parents, and teachers and parents were observed. Parents and teachers worked with video editing software and both did collaborate with the children, their children in case of parents, providing help for general computer issues or programming in Scratch.

Two particular intra-group social dynamics emerged: among tutors and among children. The members of the tutors' group worked on preliminary activity planning and on preparing fully functional technical equipment. The children helped each other working on their Scratch projects, and they tested the games as soon as they were done creating them. They acted quite independently from each other in building their games, but they have shown interest in the others' work as soon as it was done.

No particular interactions emerged among the parents: they used to talk with each other, without being really involved in the other's project itself.

B. Tabu Game

In the "TABU game", several inter-group interactions have been observed. Most apparent on the inter-group level is the dynamics that developed among the group of the children, the parents, and the tutors. Here, a strong development could be observed: Where at first, tutors assisted mostly the children but also the parents in the club in developing and collecting ideas for possible project activities, a shift towards a more creative and independent way of thinking and acting on the side of the parent and children participants could be observed after a couple of club sessions. Especially the children learned how to voice their thoughts and opinions, listen to others and develop a common agreement for activities in the club. Parents in the club accompanied this development – rather passively at first, but in a more active and participating way, when realizing that this would mean a noticeable step forward in the project that was then decided upon. Parents engaged in coordinating and planning activities, idea collection and the help with Scratch work.

As a constant, inter-group interaction among tutors, children and parents could be observed on a technical level. Over the course of the entire project, tutors provided help with the use of Scratch or other software applications such as the image editing software Gimp or text formatting in Microsoft Word.

A second constant on the inter-group level concerns the role of the teacher: Interacting with the children, he provided help with the development of project ideas and the structuring of the opening and final discussion rounds. His interaction with the parents did not so much relate to the clubs project directly but was more aiming at making the parents feel comfortable as club participants.

This dynamics on the inter-group level affected the social dynamics on the intra-group level. Most apparently, the children discovered and developed their team spirit. Over the course of the first few club sessions they learned to value the sharing of (newly discovered) computer skills and knowledge. Often times working in pairs, they were sharing

many of the activities performed in the games project from its very beginning, such as planning activities and working with Scratch. As soon as they were done building their individual games, they also engaged in collaboratively testing those. This collaborative engagement, at all project stages, turned out to be crucial for successfully developing this communal spirit.

The parents clearly saw themselves in an accompanying role at first: In their role as parents they engaged in small talk with each other and observed their children in their activities in the club. Only later did this change into a more outgoing role, where parents took up coordination work for the progress of the clubs project and also joined their children with the game building work in Scratch.

VIII. ANALYSIS

What can be learned from the different development of these two game projects? The outcome is similar: a board game here, a board game there, both virtual, both containing several small individual games. Looking at their development the most striking difference lies in the dynamics of the interactions among participants. Again, a constant that is identical to both cases can be observed: For the dino game board as well as for the Tannenbusch game, tutors provided (computer-) technical support to children and parents over the course of the entire project.

But unlike the dino game, the Tannenbusch game did develop a momentum – what emerged over the course of the first sessions is a growing independency and self-confidence of participants. This can especially be seen in the role of the children: They learned how to develop, discuss and agree upon ideas. They learned how to compromise. They learned to focus and concentrate on one thing, and they discovered the satisfaction that is contained in the collaborative completion of a project.

These learning processes affected and maybe changed the parents' position and role in the development of the project. They accompanied the games development in a more and more active way, supporting the children in their doing by coordination and planning work, and even engaging in Scratch game design work.

For the function and position of the tutors as well as the teacher in the club, this development implied: They could step back from providing advice on the social level, e.g. structuring the opening and final discussion rounds, or aiding in the development of new ideas for projects and activities. And finally, even the level of technical support (with Scratch) from the side of the tutors decreased, when children discovered the pleasure of collaboration, and took one another's games as "master templates".

For the case of the dino game, this was completely different. Disparity in participants' age and their experience utilizing Scratch or computers in general, necessitated tutors to invest a great deal of attention supporting the less experienced participants, which, due to their activities being rather remote from the actual dino game, facilitated the emergence of two separate parties in the club.

Further, starting the project after summer break as planned,

without considering the absence of many former participants or the arrival of new ones, did split up the group as well.

In contrast to the "TABU game", the "dino project" did not see a growing independence among participants over the project's course. If anything, the changes in number and previous knowledge of participants made it inevitable to divide the group accordingly to their skills in Scratch. These sub groups did not share a common project to work on and therefore had very limited interaction.

While tutors served as social mediator in the "TABU game" at first, then decreasingly providing aid on a technical level, while participating teams supported each other, they could not establish this role during the "dino game" project. Intense mentoring activities depict the tutor's major role throughout the project; on social, as well as on technical level.

IX. PROJECT PHASES

On a general level, the inter- and intra-group dynamics that have above been described for the case of the two game projects follow a similar structure. The five main phases that can be identified in the two cases – having evolved a bit in comparison to previous findings [2] – are: Brainstorming, planning, execution, wrapping-up, and reflection. Following this basic phase structure in our analysis, we can identify critical points for successful project work with children and adults in computer club settings, which we then sum up in a set of guidelines to be used for project work in "come_IN" clubs or in similar settings.

A. Brainstorming

A brainstorming phase marks the beginning of each of the two analyzed projects. Both clubs had just finished with a project and were searching of something new for them to do. But where for the case of the "dino project" this brainstorming was motivated by the idea of one child and then pursued first and foremost by tutors and the teacher, it emerged from various individual works happening simultaneously at the club in Bonn Tannenbusch. In both cases, the clubs' opening discussion rounds were the place, where all participants were invited to actively engage in the proposal and negotiation of opinions and ideas on the new project.

So, there is an important difference between the two projects in the inter- and intra-group social dynamics in this phase. For the case of the "dino project", momentum is on the side of tutors and teacher, who take on the idea of one child before summer break, advertising it as the activity for the club to continue with after the holidays – brainstorming for the side of children and parent participants then meant to engage in putting this given topic to life. For the case of the "TABU game", momentum is on the side of children and parents, who were already involved in individual projects, but wanted to engage in some kind of collaborative activity. Here, brainstorming meant discussion on how the current individual activities could be combined into a collaborative one; it was the role of teacher and tutors to support this process by helping to structure the discussion.

B. Planning

In this phase, the two projects developed quite differently. Where for the "dino project" individual projects were newly developed and planned as part of the joint game, with the help of the tutors, planning in the case of the "TABU game" meant the reorganization of ongoing individual activity in the club to fit with the common game. Here, momentum remained on the side of children and especially the parents in the club, who engaged in the planning of the meta-board of the game, whereas the tutors were in a more subordinate role, engaging in individual help with the planning of the Scratch games.

In both studied cases, the meta-planning extensively took part in the beginning of the new project concurrently with the individual participants planning, but continued as a cross-sectional activity throughout the entire course of the project.

C. Execution

In the execution phase of both cases, children and parents worked on their individual projects. Meta-project activity remained mostly on the side of tutors and teacher in the "dino project", and children and parents only occasionally contributed to this, e.g. by helping to create pieces of the game's meta-board. In the case of the "TABU game", especially the parents got involved in meta-project activity, such as the coordination of the various individual games and the creation of the meta-board of the game. Here, tutors took a secondary role, helping with the individual Scratch projects, as well as with the meta-project, when problems occurred. Especially in this phase, a high level of collaboration among the different groups in the club could be observed, with children helping each other in their game creations or trying out completed ones, parents engaging in coordinative activity, tutors providing technical (Scratch) support, and the teacher monitoring the collaborative progress of the project.

This is the longest phase, lasting over the course of some weeks in the case of the "TABU game", and several months in the case of the "dino project".

D. Wrapping up

The collecting, combining and integrating of the various individual games into the meta-game marks the wrapping-up phase of the two projects. But where this phase subsequently followed on brainstorming, planning and execution in the case of the "dino project", it could be observed in parallel to the execution phase in the club in Bonn Tannenbusch. This simultaneous, even reverse order was due to the fact that participants there had already been involved in individual game designing activities when agreeing on combining these to a common game board.

This difference in the development finds its continuation in the inter- and inter-group social dynamics: For the case of the "dino project" the tutors had a large share in the collection of the sub-projects and the combination of those into the meta-game. They were also engaged in identifying gaps and redundancies in the work of the individual participants and, with their support, the diminishing of these. In Tannenbusch, the participants themselves took the lead in this phase – especially the parents got actively engaged in the integration

of the children's games into the meta-game. These inter-group activities strongly gathered momentum from the fact that children and adults had independently come to the agreement on the game as a common project. Tutors were asked for technical support and help with Scratch problems, but did not have to interfere in organizational tasks.

E. Reflection

Reflection for the case of the "TABU game" again overlapped with the previous phase of wrapping-up, and consisted of several smaller steps and one common final step: On the intra-group level, children did reflect in a very practical way on their individual games, by immediately trying these out when they were finished, exchanging comments and feedback for possible improvements. On the inter-group level, teacher, children and parents reflected on the progress of their project work and on ways to improve their way of keeping company in the club. The joint playing of the "TABU game" in a competition among the club's participants marks the final common step of this project.

For the case of the "dino project", participants presented their work internally among each other in the club.

X. A PROPOSAL OF GUIDELINES

From the comparative look at the development of the two computer club projects, we can distill a number of guidelines that are relevant for the successful implementation of project work in the club and in similar contexts.

A. Brainstorming

Here, the comparative analysis of the two cases reveals the importance of the role of teacher and the tutors in this phase. This does not mean that they should be in the center of activity. Rather, their role is of a secondary, supporting nature: Once a common project finishes, especially the teacher and tutors support and structure the collaborative thinking and discussing of new project ideas in the club, inviting children and adults to actively engage and participate. Come_NET can support this brainstorming process by providing communication channels across clubs. If tutors and teacher are careful not to control and influence this process of idea negotiation too much, but rather to engage in helping participants to independently master and structure the process of idea collection, this helps all subsequent phases of the common project that is then agreed upon.

B. Planning

Our comparative case study proves the importance of the factor that everyone is encouraged to participate in the planning of individual project parts as well as the meta-project. Here, the difficulty for tutors and the teacher lies in the bridging of age differences among participants in the club, and in the inclusion of newcomers. And the case of the "TABU game" indicates: The success or failure of this effort determines, whether all following phases of a project gather momentum or not. It played into the hands of tutors and teacher in Bonn Tannenbusch that the club consisted of a relatively stable group of participants, due to the fact that it

got started out of one class. Thus, there was common ground for participants to share already. .In case of other come_IN clubs, which feature a comparatively heterogeneous group of participants, come_NET may constitute a virtual instance of a common ground for spatially divided club members.

If this is not the case, and fluctuation of participants is high, it lies in the hands of children and parents as well as tutors and teachers, to create an atmosphere, where this momentum for a common project can develop. For teacher and tutors, this implies the necessity to carefully structure and guide discussion rounds and negotiations among participants – especially children do not yet have developed much experience in this area. Teachers, as well as tutors, have to be aware of changes in the group structure: If there are newcomers, the initial opening round might even be used for an extended presentation of work in progress, thus allowing newcomers to better come in contact with the group. Of children and adult participants, all this demands attentiveness among each other and everyone who newly joins the club, as well as the basic will to explore and develop things themselves.

C. Execution

The comparative look at intra- and inter-group social dynamics in the two cases showed: If participants have now developed a sense for the project and have made it "theirs", the development of the project in its execution phase is brought forward by children and adult club participants more or less independently. Here, it is the role of the tutors to see where and when technical help is needed, and otherwise take a back seat in the progress of the club's work. May it be for awareness reasons or to document different artifact versions from the participants. In perspective, come_NET aims to support the project execution, especially regarding the sometimes problematic file saving process of project works, which has been an issue of our earlier research.

D. Wrapping up

The "TABU game" shows that this phase may be closely linked, even interweaved with the execution phase. If children and adult project participants managed to organize the necessary steps independently, teacher and tutors can stick to a supporting, secondary role. During this phase, come_NET may play a beneficial role to maintain an overview of the overall project progress and help to collect all sub-parts of a group project.

E. Reflection

Both cases prove that a rather practical and playful approach to reflection on the development and success of the joint project meets especially the children's requirements and expectations. For both cases, the prospect of a playful "reflection" on their game project in the form of a joint game competition in the club even fostered to a large extend the participant's motivation in the previous execution and wrapping-up phases. Come_NET can be used to gather those presentations and summaries of project outcomes, coincidentally creating a repository that serves as an idea database for upcoming projects and brainstorming sessions.

XI. LIMITATIONS

Being focused on two collaborative projects coming from two very similar computer club settings, each following the same basic concept, and each only lasting for several weeks, our comparative analysis can only provide a well-grounded but limited view on the positive and negative effects on collaborative project work with children and adults. We cannot tell yet, whether similar observations could have been made for smaller projects, lasting only a couple of sessions, or developing in other settings, e.g. with many more or just a few participants.

XII. CONCLUSION

The comparative look at two computer club projects that started out similar but then developed in rather different ways provides us with a set of guidelines for collaborative project work in intercultural computer clubs or similar contexts. In our analysis, we distilled the development of the initial brainstorming and planning phases as being critical for the further progress of a project. Moreover we showed, how participants structuring the sessions – usually tutors and teachers – have to be aware of changes in the group structure, even extending the initial opening round for an extended presentation of work in progress, allowing newcomers to contact with the group better. Collaboratively engaging at all stages of project work seemed to be crucial for developing the communal spirit that supports project activities throughout the projects. The online community platform come_NET may prove helpful to further strengthen and broaden this collaborative engagement in the clubs.

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