

New technologies for new music education: The Continuator in a classroom setting

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ABSTRACT

In this paper we describe a new didactical experience carried out about the interaction between young children and the Continuator, an interactive reflexive musical system elaborated at SONY- Computer Science Laboratory in Paris (Pachet 2003). From a pedagogical view the general aim was to analyse if and how the Continuator can be used in the daily school activities. We are also interesting to understand the role of the teacher in two different situations: in the free games and in the guided activities with the system. The experience was carried out with 18 children of 3/5 years old, in an Italian kindergarten (Bologna). Children, divided into small groups (3/4 children), played with the Continuator for three times. The children reached high levels of well-being and pleasure, very similar to those described in the Theory of Flow (Csikszentmihalyi, 1996). They learned to dialogue musically with the system, developing autonomy and learning to manage some kinds of collaborative playing. These factors gave rise to some particularly careful and prolonged bouts of listening, stimulating the children to think in sound, spending time with the system and developing a genuine desire of "play" with music. This practice experience shows the Continuator could represent a versatile device to enhance the musical invention and exploration in classroom setting. The system's double role of partner and teacher seems to enhance socialization and an important self-regulation (Canevaro, 2002) of the group.

Keywords

New technologies, music exploration, collaborative

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learning.

INTRODUCTION

The Continuator and the DiaMuse project

The Continuator elaborated at the SONY computer Science Laboratory of Paris (France) is a particular system able to produce music in the same style as a human playing the keyboard (Pachet 2003, 2006).

The phrase generated by the system is similar but different from those played by the users. The basic playing mode of the Continuator is a kind of turn taking: the user plays the keyboard, when he/she raises hands up from it, the system answers repeating and changing the input. If the user decides to play a phrase while the Continuator is still playing, the system will stop and returning to listen mode. The Continuator is a particular kind of IRMS able to learn constantly by the input is given. The Interactive Reflective Music System (IRMS) are systems in which the user, whatever his competences' level, is confronted with a kind of developing mirror of him/herself.

The DiaMuse project collects the experiments about music education and the Interactive Reflexive musical systems. The experiments carried out, so far, with 3-5 years old children and the Continuator suggest this system is able to develop interesting child/machine interaction and creative music processes in young children, creating a state of well-being very similar to this described in the Theory of Flow by Csikszentmihalyi (1996) (Pachet Addressi 2004, Addressi Pachet 2005 a, b, Carlotti et al. 2004). The innovative function of the Continuator is the creation of a dialogue with the child, while he is playing the keyboard. This dialogue is not only founded on the turn-taking rules, but also on the mechanism of repetition and variation very similar to one observed in the infant/mother interaction by Stern (1995) and Imberty (2002). Between the Continuator and the child a circular interaction is setting up, in which the child's musical style influences the system, which answers repeating and changing the child's musical fragment, in a continuous improvisation process.

The interaction with the Continuator:

- Increases the time of attention and concentration of children
- Develops autonomy and intrinsic motivation

- Enhances music exploration and creativity
- Develops various kinds of attachment behaviors

Taking into account the results of previous researches the first author, who was a teacher of the nursery school, decided to propose the Continuator to her class. This paper will present the method, the results and the conclusion of this didactic experience.

THE DIDACTIC EXPERIENCE

This experience was inside the class project “Simon the Sound catcher” about music education. Simon is the fantasy protagonist of a story of Gianni Rodari (Emme Eds, 1995); with a funny landing net he catches sounds. Before doing the activities with the system, we played with children to recognize the different sounds surrounding us in every day life. We paid attention especially to the relation between sound and silence and also to the importance of the listen. Considering that the Continuator lets us to give a central role of the music production through the listening, we proposed to children, some games with the system from its exploration to music invention.

To realize the project we consider also some theoretic premises linked with the Theory of Flow (Csikszentmihalyi, 1996):

- The state of Flow creates “an ideal learning environment” (Custodero, 2003)
- The goal of music education should be to create and sustain flow experiences (Elliot, 1995)
- The Continuator is a flow machine (Pachet 2003, 2006).

From a pedagogical point of view the activities with the system analyses especially:

- If and how the Continuator can be used in a daily school activities with children of 3-5 years
- The role of the teacher and of the group in two different situations: in free games and in the guided activities.

METHOD

The observation was trailed in the Nursery School “Aurora Battaglia” of San Giorgio di Piano (Bologna, Italy). Taking into account both the age of the children (3-5 years) and the aim of the research we decided to maintain the school laboratory style of working with children: a small group of children went out of the class with one of their teachers and went to the laboratories (rooms previously prepared by teacher).

Setting

The project took place in the library of the school. There were: a table, 5 little chairs, a big mirror in front of the table and 6 little mattress.

Equipment

We used the Continuator, a Roland ED PC-180A keyboard as the interface, a Roland expander, a pair of amplified loudspeakers, computer, video camera, digital camera. During the third session we also used some instruments like: triangles, maracas, tambourines and harness-bells.

Data registration

We recorded on video all the sessions with all the participants. After each session teacher compiled a daily diary with some observations and comments. We took also some photos.

Participants

The experience was proposed, by the teacher, to all the class but the complete protocol was carried out only with 8 children: 5 aged 4 years (2 males and 3 females), 3 aged 3 years (females). The other children took part in one, two sessions or in a free sessions, which were also recorded on video. Children were divided in small group of 4-3 elements.

Procedure

First session: Exploration

In the first session Simon the Sound Catcher (the fantasy character) invited children out of the class, to listen the music trying to found the source of the music (the Continuator repeated a simple melody with loop). After discovering the keyboard children explored it.

Second session: Two games

In this session teacher proposed two games to children. “The little boxes”: in this game children pretend to be some animals closed inside a box; each child was invited to play on the keyboard the call of his/her animal they had thought. Then children listened the answer of the Continuator, dancing and imitate the movement of the animals. Sometimes the Continuator-echo answered repeating exactly the input of child, other times it changed the answer. After all, some stories were invented with these strange animals.

“The little chairs”: there were 4 children and three chairs. One child played on the keyboard, when he/she raised hands up, children danced on the answer of the system. They had to pay attention to the Continuator answer, when it stopped they had to sit down. The teacher invited children to dance taking into account the music characteristics of the system answers.

Third session: Tell a story

In the last session teacher told to children the tales of Jachob and Wilmelm Grimm “The Wolf and the seven

kids”. Children, with the teacher, decided to tell the story using the instruments: the harness-bells played the kids’ voice, the maracas were the mother’s voice and the wolf’s voice was played by the system. In this story the voice of the wolf is very important, because, to eat the seven kids. the wolf changes is voice to swindle and eat them.

In all the sessions free game, alone, in pair, or in group are provided.

During the sessions the Continuator played in three different mode:

- Continuator: it was the basic play mode of the system and it was described before
- Continuator/linear: the answer of the system was a linear series of single notes
- Continuator/echo: the system played exactly the same notes of the input (played by the user) in a loop way.

RESULTS

All the data collected are observed and analyzed describing what children do in the three sessions. We are, first at all, interested to the behavior of the single child with respect to the group. So in this paper we present some general aspects of the experience linked with some interesting conducts (Delalande 2001) observed during the activities with the system. Then we stop for a while especially on the role of the system and the teacher.

If and how the Continuator can be used in a daily school activities with children of 3-5 years

Exploration of the system

The exploration of the system is the first and the main action of the children on the keyboard. We observe:

- Exploration and discover of the rules of the system;
- Sensory-motor exploration of the keyboard: some children play with one finger, other with open hands, and also with the head. After this, there is a symbolic exploration looking for the best way to represent an animal, or a state of mind;
- Exploration of the different sounds: high and deep notes, black and white keys, strong or weak sounds, notes played single or cluster, etc.

Learning some rules

One of the most interesting results of the exploration is the discover and use of the system basic rules:

- Children learn to raise hands up from the keyboard the system starting to play, this allows children to decide when interact and listen the system (Fig.1). This is a great discover and most of children teach it to their partner. An other typical situation, especially

in the couple of children, was the phenomenon of “joint attention”, described by Addessi and Pachet (2005, 2004): one of the children forced the other to stop playing in order to listen the system’s answer. Addessi and Pachet call this situation “Aspetta” (the Italian word for “wait”).

- Children learn also easily they can stop the system touching simply one key.
- Some children discover that the Continuator’s answer was similar to their own. This is the beginning of the turn taking.



Figure1. Maria raises up the hands and she launches the system’s answer, listening carefully the system’s answer.

Musical Invention

We observe interesting music conducts of the children playing the system. Most of all are characterized by the listening, imitation and improvisation.

It can be possible observe this process:

1. The child listens carefully his/her productions, those of his/ her partner, and the Continuator’ ones
- 2a. The child imitates his/ her partner ways of playing (for example strongly or gently);
- 2b. The child imitates also the Continuator style.
3. Then the child tries to repeat the very short phrase that he/she had just listened, and she/he adds new elements: a note, a cluster, the same phrase played with a different rhythm.

In this process of music creation the presence and movement of the body is very important. Some children play with different parts of the body: hands, nose, elbows, etc.

Some children plays the keyboard waits the Continuator answer to dance on it, and as Young just assumes “from the child’s perspective, the sounding result is inseparable from bodily involvement” (2003).

The Simon’s Magic keyboard

Inside each session free games were provided. We thought free games like moments for relaxation and for readjustment between one activity and the following one. The free games instead had become very interesting for our observation because, during these moments, children had shown an useful *self regulation* of the group to manage the use of the space, of the keyboard, instruments without the presence of the teacher. For example: while a child was playing the keyboard alone, one child read a book, an other wrote a letter to Simon the Sound Catcher, an other one followed his/ her partner near the keyboard. A simple and implicit rule was established and respected by all the children: the keyboard is for all the children, and it can be play by one child alone, or by two, three children together a little at a time, in every moment. When the keyboard was occupied by other children, the child could wait his/her turn doing something else or joining to the other near the keyboard. It is interesting to notice that this rules was the same for all the three groups had taken part to the sessions.

The system had become quickly a virtual partner: children spoke about it as if was is real. They though that, if the system could hear what we played on it, it could hear also what children said or did . So the Continuator is not only a magic toy (some children called it “the Simon magic keyboard”), but also a partner which is able to answer, to listen, and to play.

Concentration and excitement

The experience with the system was characterized especially by two emotive states. Generally when the children played the keyboard alone, exploring it and trying to dialogue with the system, they were very concentrated (Fig.2). They focused attention both own their on productions, and on the system’s answer. They lost the perception of time and they were not interesting anymore about what other children did in that moment. Instead, when children played together with the keyboard, or when they did a game (Fig.3) together, they were very excited. It was possible observe an explosion: children laughed, their tone of the voice became higher, they called teacher and partners, they played the keyboard with strength.

Sometimes, in free game, there were also some “dead moments” in which the child preferred to read a book, dance, listen, or talk with teacher.



Figure 2. Federica plays gently the keyboard with one finger



Figure 3. Thomas (in the middle) plays with strength the keyboard while his two partner (sat down) are looking at him and listening him.

The role of the teacher and of the group in two different situations: in free games and in the guided activities.

It is interesting observe, inside the organization of the group, the role of the teacher. We notice especially some functions like:

- The preparation of the space, and of some devices (Frapat 1994) to make easy the exploration for the children. Inside the word “devices” we can include concrete ones like the keyboard, the mirror, the instruments, and also “abstract” devices like the games, and all the pedagogic organization of the activity (the number of children, of the sessions, etc)
- Participating observer. Without using words teacher can reinforce the exploration and production of children looking them with attention and without valuating.
- Relaunching of the music invention of a child to all the group, proposing new game to “extend the explorative behavior” (Mazzoli 1997)
- Teacher as a partner of the games. Since the first session the teacher did not play the keyboard and she did not say how it works. From this point of view the competences of teacher are the same of children: she

hasn't to teach anything to children, instead she can be a partner of the games.

Me and myself

We would like to describe the role of the big mirror in front the table. The original function of the mirror was to be an observe instrument for the teacher: with it the teacher could control her movements, presence/intrusiveness inside the group. Instead from the first session the mirror became for the children a real device to:

- Observe the partner and the teacher during the free game
- Be "tune in" the group in "the little boxes" game
- Observe own facial expressions during the exploration of the system and listening the system answer (Fig.4)
- Observe the partner when two children play together

The mirror represents a support for children, allowing them to develop a high level of control of situation, (Csikzscentmihalyi, 1996) without asking constantly to teacher confirm or support about activity.



Figure 4. Lucia observes with attention the mirror while she playing the keyboard

The collaborative learning

From the exploration to the invention of a story with some animals, the activities proposed by teacher was based on the group. The observations reveal the presence, especially in free games with the system, of typical conducts of the collaborative learning:

- Sharing the discovers and the new invented games with other partner and with the teacher
- Tutoring. Children try to explain to their partners the rules of the system. For example we observe: 1) children teach to their partner to launch the answer of the system raising up the hand; 2) children show that the system imitates them, and it is possible the system

makes a joke to the children. The function of tutoring is very important for the adult, because it represents one of the few moments in which children spontaneously speak about the system working (implicit knowledge) to their partner.

- The invention of rules to play the keyboard by two or three children together: they established how to play (using all the keys or only one part, playing with the fingers or with the hands, playing only the white or black keys) and in which order (they established the turns).
- The invention of sound games between the system and some instruments: "the little orchestra". The answer of the Continuator becomes a base on which other children improvise with the instruments (Fig.5). Since the children learn the turn-taking with the system, they can decide the precise moment to launch or to stop the answer of the Continuator. While a child was playing the keyboard the other listened carefully and, when the child raised the hands up (that is the sign), they began to improvise with instrument on and with the system's answer. It is interesting notice that the child had played the keyboard, during the improvisation listened and commented the performance of the other, like a real orchestra conductor.



Figure 5. While Alice plays the keyboard, Ilaria V. plays the tambourine on the Continuator's answer.

CONCLUSIONS

In this paper we have described a didactic experience carried out in a nursery school about children playing with an interactive reflective music system: the Continuator. The results show an interesting interaction between the children and the system. In particular we would like to underline how Continuator promotes, inside the group, a state of well-being characterized by high level of intrinsic motivation, control of situation and excitement, very similar to those described in the Theory of Flow (Csikzscentmihalyi 1996). The double role of the system of partner and tutor enhances the music creativity and "a

pedagogical practice based on the discover and on the invention” (Delalande 2001): children discover and invent, for example, new solutions to link music with dance, to imitate the call of the animal. This music inventions are associated to a strong and participating listening of own production and of the other ones. We notice also that the system promotes an interesting difference between behavior and music conduct when children play with the system in the different sessions: the action maybe is always the same (touch only the white keys, for example), but the behavior become, from the first session to the third, conduct because the motivation and the expectations are present.

From a pedagogical point of view working in a group fosters collaborative learning through: a mutual and circular imitation, the tutoring, the explicit communication, between children, of own intentions (for example, a child said to his/her partner: “now I play white keys, while you are playing the black ones, but then we’ll raise up the hands together”). Crook (1994) asserts that is essential, for children playing together with a computer, to communicate the own intentions to create a common field of discovers and skills. In our case, the system exploration, carried out with all the group, had allowed to share the discover of rules of the Continuator, reducing the time of exploration.

The system had also filled an important role in the self regulation and autonomy of the group that was essential: “playing music together, from one hand reduces the time of individual exploration, but on the other hand, it requires a steady regulation of the group in order that children are not overwhelmed by the sounds” (Staccioli 1989).

Working with the Continuator the role of the teacher is not “to teacher, but to observe and to encourage (...) children imaging the situations that allow the music play” (Delalande 1993). The teacher’s instrument of observation is not more an instrument to valuate children’s performances, instead is a instrument to know and share (Mazzoli 1997).

In the light to these and previous results, we assert the Continuator is able to elicit interesting child/ computer interaction stimulating music creativity, and we are preparing new protocol for new didactic experiences.

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