

# Co-operative parent-child learning: *In computerised technological environments*

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**Abstract:** The paper describes parent-child interactions within two computerised and technological environments - the internet Forum and LEGO-Logo. Courses in LEGO-Logo were held over four years for sixth-grade gifted children, with the willing participation of their parents. LEGO-Logo lends itself to and allows for a rich choice of activities in various fields, by project-oriented teaching. During the last two years an internet Forum, in which they could present questions, suggestions, and ideas, was introduced. The findings show unequivocally that these courses help to foster and cultivate thinking and creativeness of the participants, as well as establish close familial relations and bring about better understanding between parents and their children. Applying the internet in order to help learning was a little disappointing, and there is a need to study more about how to improve it. Nevertheless, the idea that parents and children could learn together co-operatively has become a reality.

**Key words:** co-operative learning, team learning, parent-child relationship, learning environment, computerised-technological environment, project-oriented teaching, gifted children

## 1. INTRODUCTION

A child's world is reserved and restricted, kept at a distance from the adults' world. Many parents are too busy to be in contact with their children. Thus, it is often observed that children who grow up alone are under the influence of their peers. Consequently, we hear about crimes committed by frustrated youngsters who may be motivated merely by schooling failures.

Studies show that strengthened connections between children and their parents improve children's academic achievements (Bass, 1994; Poirot and

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Robinson, 1994). A very wide and comprehensive study in the United States found that such strong and supportive ties help children to prevent risky behaviour, such as suicide, violence, and substance abuse (Schroeder, 1997). Thus, during previous years some interesting projects have been conducted to support the significance of parent-children relations. One of the above was undertaken through workshops organised for whole families of one school (Goodman, Sutton and Harkavy, 1995), while another provided computers to the students' homes with printed materials for use by parents and their children (Fullerton, 1995).

Now, let us think for a moment about teams of children and their parents learning together. Is it possible? After all, most children do not see their parents go to school, or sit in front of a teacher. Nevertheless, will such collaborative learning be worthwhile for children and their parents? How is it possible to use the internet to improve learning and understanding?

There are very few learning environments where team working is so intrinsic as it is in LEGO-Logo, which almost does not depend on any teaching method. Does it affect parent-children interactions as well? The following paper will give partial answers to these questions and will deal with six subjects:

1. A description of the LEGO-Logo system;
2. The educational approach;
3. The co-operative parent-child learning process;
4. Records of the follow-up activities at home;
5. The influence of shared learning on family relationships;
6. Using the internet Forum to foster learning processes.

## **2. LEGO-LOGO SYSTEM DESCRIPTION**

LEGO-Logo, as its name indicates, is a combination of Technical-LEGO (the technological aspect) and of Logo (the computerised aspect). The combination of these two has a much greater effect than each one by itself. Recent findings (Jarvinen, 1998; Krumholtz, 1998) show that it is a suitable learning environment for designing technological systems and control programming. It encourages diversity in several ways: in project themes, working styles, entry paths, and with many different types of design: software design, mechanical design, and structural design (Resnick and Ocko, 1991; Carlsen, 1998). Thus, LEGO-Logo offers an abundance of activities within a well-defined framework, where everyone can find something personal and interesting to do, and thus can learn.

Inclusion of sensors in LEGO-Logo allows the transfer of information to-and-fro between LEGO and Logo through an interface-box. As a result, one can build LEGO-machines, operated and controlled by Logo programs.

### **3. THE EDUCATIONAL APPROACH**

Any learning environment that allows activities in team projects can perform an astonishing positive change in the learning process (Denton, 1994). LEGO-Logo, like other active co-operative learning environments or methods, fosters respect for learning (Graves, 1993).

Learning processes are reinforced by feedback from computer programs, LEGO models, other teams, and the teacher. During study in class, students organise themselves in teams. Each team chooses an authentic project, plans, builds, and carries it out accordingly. Teaching, in this environment, is performed by project-oriented learning. Thus, rather than frontal-teaching, the teacher assists with problem-solving, by guiding questions and directing hints. The teacher may also be a catalyst or may introduce new ideas (in technology, programming, mathematics, etc.) such as the inverse ratio between motor speed and its strength, or how to structure a program. Teaching is performed by conversations with each team separately and by whole class discussions about general ideas, which may be common to all.

In LEGO-Logo students have to share, talk, debate and relate one to another. They learn how to work with others and how to help each other. Hence, this system has a positive effect on classroom social interactions. The students learn to work co-operatively in groups as well as use computers better and plan shared authentic projects (Barak, Waks and Doppelt, 2000). Does it affect parent-children interactions as well?

### **4. CO-OPERATIVE PARENT-CHILD LEARNING PROCESS**

The LEGO-Logo course described here has been used for four years in the spirit of Papert's book 'The connected family' (Papert, 1996). The course was designed for sixth-grade gifted children with their parents. The sixth-grade students used to study once a week in a school for gifted children located in a central college, and during the rest of the week they attended regular schools in their regions. The whole year course was organised and supported financially by that school. The course teacher during the first two

years was the writer of this paper, but in his lessons were observers from that college.

The first meetings of the LEGO-Logo course were held in an atmosphere of embarrassment and confusion. The children were generally 'computer-friendly', particularly with Logo, which they had learned in school for two years. Their parents, however, were mostly 'computer-illiterate', anxious and hesitant. Nevertheless, they attended the meetings, aware of the significance in fostering and cultivating their children. During the first stage they could even feel, occasionally, some derision and scorn from the children. Later on, during the course, the parents overcame their insecurity. Their experience, especially their technical skills, helped them with problem-solving and at times, the parents' abilities even surprised their children.

The natural friendliness and intuitiveness of the whole environment enabled the parents to become more and more involved, especially when the computer language was in their native language. The parents helped their children and even became useful at programming.

At first, the parents' ideas about programming were expressed in a common language and the children translated them into Logo. But, in a short time the parents became fluent in Logo, reaching the stage where they could express themselves and make suggestions in this programming language.

## **5. RECORDS OF ACTIVITIES AT HOME**

The evaluation, which accompanied the course, puts forward several points about the social aspect of the parent-child courses. Two of these points are discussed in detail here and in the following section. The first is about follow-up activities at home, and the second is about the influence of shared learning on family relationships. The evaluation was composed of questionnaires completed during the middle of the year, of observers attending the whole year and of some video recordings. The results presented here refer to the period of the first two years, during which 20 parent-child teams participated.

Reports of the questionnaires were received from 18 pairs (9 each year). They did not answer all the questions, according to the observers, because they were too busy with their projects and did not want to waste time. So, only 50% of the parent-child participants answered the question regarding the follow-up collaborative activities done outside class. These after-class activities were categorised as follows: searches for improving programs, which began in class, continued at home, even without computers; there were efforts to continue programs on computers at home, yet without interface-boxes which were very expensive; there were discussions about the

course during family meals (ideas, solutions); there were discussions about class materials while driving back home together. Thus, there were many types of outside class activities among parents and their children as a result of the co-operative learning of LEGO-Logo.

## **6. INFLUENCE ON FAMILY RELATIONSHIPS**

Regarding co-operative learning influence on relationships in the family, positive reports were received only from one third of the pairs. Nevertheless, some of them were very moving and are quoted below from the questionnaires. The four following quotations are from parents (three fathers and one mother):

1. "The course strengthens the friendship between me and my son" (although the father was too busy and only attended half the meetings).
2. "I am divorced and the course enables me to develop closer relationships with my son" (a father whose ex-wife has custody).
3. "There is now more awareness and understanding of subjects I deal with at work" (a father who was pleased that his daughter and even his wife had been learning topics that were close to what he does at work).
4. "I don't think there is any influence on our relationship at home because we have always enjoyed doing things together, but there is certainly a great pleasure in shared learning" (a mother regarding the activities with her son).

The next quotations are from the children (not of the same parents):

1. "The course creates closer relations with my mother and enables me to discuss many subjects and ideas with her" (her son).
2. "I am usually with my mother and now I spend Wednesdays with my father" (his son).
3. "I think so [that there is an influence] because Wednesday is my day with my father" (his daughter).
4. "During the meeting my father behaves more like a friend. The team-work with him teaches me to work co-operatively" (his son).
5. "I tell my father what I think, and together we use the words I learned in Logo" (his son).

The above quotes demonstrate emotionally the creative experience of co-operative work between parents and their children. They also refer indirectly to the improvement of communication and closer family ties in the above cases. These findings were supported and even strengthened by the observers' reports.

These results showed a higher level of collaborative learning than had been reported before (such as in McBride, 1989). The parents became real

partners in working on LEGO-Logo projects. They learned more about their own children and influenced their developments. As a result, they enriched their familial relationships and became closer and more understanding toward one another.

## **7. USING THE INTERNET FORUM TO FOSTER LEARNING PROCESSES**

After we had noticed that two hours really was quite a short time for learning LEGO-Logo, we opened an internet forum as an additional communication and learning channel. The students used the forum in order to send their questions, answer their friends' questions, suggest solutions to the problems that were presented there, and read their teacher's hints.

At first they were very enthusiastic about the new communication environment. They sent many questions to the forum, mainly technical ones such as: "Is there any command to operate the car and the 'green' of the lights together?". In that specific case, before getting the 'right answer' from their teacher, one parent sent her suggestion. She wrote that "in order to imitate the real world, it is better that they should not start working at the same time, since the driver (of the car) starts a few seconds after he sees the green light".

Nevertheless, and to our disappointment, as time passed the use of the forum declined, maybe because the projects and the questions about them became more and more sophisticated. One boy explained that he stopped using the forum since he preferred to get face-to-face answers from his teacher in order to get a better understanding. Another student said that he has no patience to write the explanations for his questions so that the teacher will understand him.

In the first two years the programs were only three or four pages long. However, in the last two years they were much longer. The longest program was 72 pages long, probably due to the fact that it was written in their native tongue, in the Hebrew version of LEGO-Logo.

## **8. SUMMARY**

The main benefits of this computerised-technological environment are: creating a community of learners, changing the teacher's role in class, and using the students' authentic projects as a base for the learning process. This paper emphasises the importance of a rich learning environment, such as LEGO-Logo, which broadens the student's horizons and enables both parent

and child an intuitive learning of interdisciplinary subjects through their own personal activities. Every activity must be done co-operatively in small groups, as in real life. The educational potential embodied in this versatile system exists on condition that the teacher inspires an atmosphere of freedom to choose, to decide, to create, to explore, to program, to communicate, to share ideas, to struggle with problems and above all to allow the making of mistakes in class.

The internet Forum and LEGO-Logo are learning environments that allow students to build team projects, and may help educators to develop skills such as: communication, presentation of products, and problem-solving. These are novel and inventive systems that offer a wide variety of opportunities for interesting familial activities. The fact that the environments were almost new to both parents and children enabled real teamwork learning.

The main sociological results were enhancing inner family connections and improving mutual communication. These results were mainly due to the imbalance between lack of programming experience on the parent's part and lack of an adult life experience on the children's. Hence, the learning environments helped parents to achieve, not only wider knowledge in programming while minimising their fear of computers, but also a much better understanding of their children, which is the greatest benefit of all.

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