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"Chess for overall development" software in the frame of Reflection and Activity*

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Abstract

The paper discusses "Chess for overall development" project, which is based on Reflection and Activity Approach in helping overcome learning difficulties. The project has been running for over 12 years now, putting theory of the approach into practice in several cities throughout the Russian Federation. One of the key elements in this project is developing the ability to think in mind using chess problems and sequential progress through material where solving of problems becoming more idea-based and less action-based using the notion of the stage-by-stage formation of mental actions. Unlike other methods teachers use to teach chess, the Chess for Overall Development project views chess primarily as a psychological instrument for helping develop the ability to think in mind. The basis for the ideas of the project is L. S. Vygotsky's cultural-historical psychology. Vygotsky's notions on the development of the human psyche are implemented and partially expanded as part of the project. In recent years the software "Chess for overall development" was made designed with full compatibility with the principles of the reflection and activity approach and implementing the notion of the ability to think in mind development and sequential transition from material to ideal plane of mental actions. We present detailed description of the software features as well as its approbation results collected in schools, universities and hospitals.

Keywords : Cultural-historical psychology; Development; Learning; Help in overcoming learning difficulties; Pedagogics; Reflective-activity approach; Chess for overall development; Ability to think in mind; Stage-by-stage formation of mental actions; Computer software.

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*. The Chess for Overall Development website [electronic resource], http://www.chess-od.com

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Introduction

The issue of grades or evaluation of the educational process at schools is relevant in any society and throughout history. Usually, schools have a clear division – two opposing ends of the educational process – when it comes to results. The "straight A" students, the "stars", the successful students are compared to the students lagging behind, receiving poor grades, misbehaving. In addition, the teaching staff as well as most students traditionally treat the "stars" well. They treat the students lagging behind as the root of various problems within the school environment (which, one must note, normally has a sound basis). It is clear any professional teacher dreams of having more "stars" and as few students lagging behind as possible. Attempts to solve this problem within the system in a straightforward manner, making students who test poorly answer many questions relevant to a specific subject often fail to achieve the desired results. Even specific changes in grades or scores, which tend to improve when working on a specific subject, do not mean improvement in behavior, additional subjects (part of the school program), and relationships with other students... The students who used to lag behind do not change much. One must ask a question, which stems from the data mentioned above: can it be possible to approach the issue of low grades and the desire to improve the student's achievements so as to positively influence the results, the level of knowledge, as well as the students' quality of life? One of the attempts to answer this question with a "yes" is the "**Chess for Overall Development**" project.

The Chess for Overall Development project has been running for over 12 years now, putting theory into practice in several cities throughout the Russian Federation. Professor V. K. Zaretskii is project manager in Moscow, working within the framework of an approach he and his colleagues are developing – the **Reflection and Activity approach** - helping students overcome learning difficulties (V. K. Zaretskii, 2013, 2016). The approach is part of a psychological methodology used for this project. One of the key elements in this method is developing the ability to think using chess problems and their solutions (V. K. Zaretskii & Gilyazov, 2016). When one works within this framework, one must assume the mental process will gradually change, becoming more idea-based than action-based. This assumption, in turn, is based on the ideas of the "stage-by-stage formation of mental actions" (Galperin, 1966). Several schools in Satka, a town in the Chelyabinsk Oblast, have been using this method, based on the Reflection and Activity approach, for the past 12 years. As part of the project, students who participate in the program as well as students from various control groups (including groups that did not play chess or participate in alternative chess related projects) have been the subject of a comprehensive psychological diagnosis.

Unlike other methods teachers use to teach chess, aiming to improve the students' ability to play the game, the Chess for Overall Development project views chess primarily as a psychological instrument. The goal of the project is not just chess. It is mainly set to influence the students' psychological development, their ability to learn how to play the game while changing the quality of their higher mental functions. It aims to reinforce the students' positive approach towards the learning process, to support the child's ability to

assume a subjective point of view on his/her learning process. The decision to use chess instead of other games to influence students' development is not a mere coincidence. One can quote N. G. Alekseev, a member of the project's development team, "Chess is a game created by God himself to develop the ability to perform mental actions" (Alekseev, 1990).

The basis for the ideas used to create and run this project is L. S. Vygotsky's cultural-historical psychology. Vygotsky's notions on the development of the human psyche are implemented and partially expanded as part of the project (V. K. Zaretskii & Gilyazov, 2016).

During the past few years, as part of the project, a computer program, "Chess for Overall Development" (authors are V. K. Zaretskii and A. A. Chernysh), has been created and is available on the internet (http://www.chess-od.com). The program implements the principle ideas of the Reflection and Activity approach and actually enables the users to transform the thinking process, moving them from the "material" plane to the "ideal" (internal) plane. This move requires several stages such as minimizing actual aid and verbal representation of actions.

1. The psychological methodology of "Chess for Overall Development"

The methodology of "Chess for Overall Development" (V. K. Zaretskii & Gilyazov, 2016, 2017a, 2017b) consists of two parts, designed for the first and second year of study respectively.

The methodology for the first-year fits children who do not know a thing about the game of chess, starting from the basics as well as children who have partial knowledge, understanding the game to a certain extent. It is usual for children from these two groups to play with the game instead of playing the game. That is to say – they primarily use the game of chess in order to increase their ability to think. As a result, playing with the game makes this methodology as useful for children who have some knowledge of the game as it is for children who cannot play at all. The difference is only regarding the question – when to introduce exercises focusing on the game itself. One should do so somewhat later with beginners.

The first part, which focuses on chess, follows the usual structure of most educational programs. It includes the following topics (V. K. Zaretskii & Gilyazov, 2017b):

- Introduction;
- The Chessboard;
- Rules of chess moves and rules of the game;
- Reasons, the essence of chess and goals; possible outcomes;
- Phases of Chess;

- Positions in Chess;
- Exercises: mate-in-one move;
- Practice – Playing the Game.

Each lesson in the program contains three types of exercises:

1. Basic exercises meant for all levels.
2. Difficult exercises, which may cause problems for students while doing individual work.
3. Advanced exercises, which may cause difficulties for most students.

This list of exercise types is dependent on specific situations, since "basic" exercises may seem difficult for some learners and "difficult" exercises may become understandable for learners at a certain point in time. It is recommended, therefore, that teachers working with this methodology in mind do not limit the educational process and continue to search for more exercises or make them up to expand the existing set. Some exercises could prove more efficient for specific learners and be of great use to them.

Studying with the use of "Chess for Overall Development" methodology is significantly different when it is compared with traditional chess lessons and teaching methods:

- The focus is mainly on developing the learner's abilities (and the first of these abilities is to compose mental images of possible actions) rather than improving the learner's basic skills as a chess player.
- The lessons are meant to provide every child with the option to move within one's zone of proximal development. In other words, the aim is to create appropriate conditions, allowing the child to progress along his/her own developmental path.
- The part of "Chess for Overall Development" which includes the ability to reflect and document one's reflections in a unique format exists in a special workbook (V. K. Zaretskii & Gilyazov, 2017a).
- Moving along one's developmental path is possible thanks to allowing each student to have his or her own rate of progress and level of understanding chess. Furthermore, the individual development dynamics of the child's abilities to compose possible mental images is taken into account.

This final observation requires further explanation. One of the most important terms within the reflection and activity approach is the "developmental path". This term assumes

a specific area in which the action takes place, allowing the learner to advance, acquire new information, expanding the possibilities the learner already has (V. K. Zaretskii, 2016).

The learning process, when "Chess for Overall Development" methodology is used, involves moving along several developmental paths at once. This happens thanks to direct interaction with information (such as training one's visual memory) and to the development of the student's ability to compose possible mental images during class. One can assume moving along a specific vector may have positive influence on movement along other development vectors as well. In view of these movements, one can see how the ability to compose mental images may become a resource, allowing the student to move forward in several developmental paths at the same time.

It is true the lessons have a specific order or continuum and follow a plan. However, every lesson allows the children, who learn together in the same classroom, to do different tasks. These tasks may vary and be difficult for some or easy for others, differ in content or type, allowing each student to progress on his/her own, studying individually tailored learning material. Different children may need different amounts of time to grasp the same information. The student also has the ability to form and alter his/her own lessons, formulating individual ideas or plans. The plans must be discussed with the teacher (as this is one of the rules both adult and child must follow while interacting). The methodology assumes individual work as well as group work with students in the classroom.

Some of the necessary conditions, allowing overall development of the student, are establishing contact: assuming the position where cooperation is possible, actualizing the subjective position of the student, working with difficulties in the student's zone of proximal development. A teacher should stress the fact a student may reflect, use the concept of internalization and nurture the student's inner potential (V. K. Zaretskii, 2016). It is recommended that the teacher, relying on these conditions, should follow a certain order of events when planning an individual lesson, regardless of the lesson's theme.

This certain order of events or action scheme includes the establishment of an emotional-informational contact. The adult may assume different roles during the process. Some examples are – assume an active role, reflect and observe, help the student. The student also has a choice and positions oneself differently when interacting with the teacher. A child, just like an adult, may feel very strongly about something and truly need to share these feelings. When one does not allow them to be seen or heard, it may interrupt the learning process. Understanding each other's emotional condition allows mutual understanding and empathy. In addition, establishing contact at the level of meanings and attitudes is easier when the beginning of the lesson includes reflecting upon the self. One may attempt to find out about important events, which happened during the previous lesson, asking the student if any thoughts may have surfaced regarding these events or requesting to learn about specific needs the student may have and wishes to share as part of the ongoing lesson. In most cases, children start to consciously express and verbalize their own difficulties and problems or suggest topics for further discussion during the lesson. This stage, which includes reflecting and thinking, should result in mutual plans for the ongoing lesson or for future lessons.

The next stage should be to allow the child to complete exercises independently in order to establish the child's zone of proximal development in chess. The student may complete the exercise independently before the lesson instead of doing it during the lesson. It is important to stress the child must complete the work independently and no sign of others' help should be encouraged. In case the child completed an exercise with someone's help, it is highly recommended to find out which part did the child complete with no help and which part caused difficulty, what type of help did the child require and how did he receive it. Finally, find out how efficient was the help. When the teacher or educator does not follow these guidelines, there is always a risk to evaluate the student's actual abilities incorrectly and falsely understand the limits of the student's abilities. It is therefore important to share an understanding of the great value in individual work done independently with the students' parents and see it as a necessary condition for the child's development.

A student may make mistakes when working independently or find the work substantially difficult (which should occur in case the exercises the teacher chose are the right ones and fit the student in terms of difficulty, level and/or achievability). The adult and the child have a good reason to work together when the child encounters difficulties. The child may try to solve some problems together with the adult in order to learn and become more experienced.

The adult should help the child to reflect and analyze what the child has done already. This includes consciously grasping the difficulties or mistakes made; helping to create a connection between the mistake and the way towards solving the problem. The adult should help the child notice the disadvantages of the previous solution and come up with new methods to solve the problem together, test the new solution and see whether it works. The adult may offer different exercises to achieve this, causing the child to test the solution and see whether it is good enough. In case the new solution does not work, the student should continue to improve it. In case it works – the teacher can suggest the next exercise. In order to finish working on a solution the student and teacher should document it so that it remains fixed in the actual form the child may use in the future, rather than just becoming part of our unreliable memory. The teacher should not waste time memorizing in particular, since involuntary memory, as work by P. I. Zinchenko shows, is a lot more efficient than voluntary memory (Zinchenko, 1961). The scheme, which should conclude the lesson, is similar in structure to its beginning. The individual lesson should end by reflecting upon the lesson.

When one examines the structure of a group lesson, one sees that all stages mentioned here, regarding the individual lesson, are also true regarding the group lesson. A group lesson requires the teacher to face the class as a whole as well as every individual in it. Teachers often argue against this view, claiming it is not possible to achieve. It is true in case the lesson plan is traditionally structured, making the whole class do the same exercises, understand and implement the same topic. However, this type of lesson has disadvantages examined here and entails possible negative outcomes, effecting groups of children. It is possible to read more about structure and lesson plans looking at examples

of math lessons in N. A. Antonova's (2013) article. Her experience can definitely be useful and implemented accordingly when planning chess lessons.

It is possible to make planning easier by dividing the class into groups of 12-15 students. It may also be useful to divide the groups according to students' level of understanding of the game of chess.

The teacher will acquire very meaningful assistance in case he or she decides to work with another teacher or psychologist (V. K. Zaretskii & Gilyazov, 2016). Some reasons to support this are:

1. working together in every given moment throughout the lesson, the teachers are able to maintain two important processes vital to their success: processes of operational and reflective control. One teacher is always observing, ready to become an active participant when necessary, get involved in case it seems the other teacher should change something, and introduce corrections;

2. The teacher may not be teaching the entire class, but he or she may offer additional help to individuals or small groups who cannot keep up and require an individual approach. The teachers may divide the class when the need arises, creating several groups. Each group is free to work on different exercises;

3. Complex situations may occur during class, requiring creative thinking and searching. Situations of this sort make the presence of two adults extremely important. Two adults can solve a problem requiring creative thinking in a highly efficient way, six times more efficient than one adult (Y. V. Zaretskii, 2014);

4. Having another teacher in the classroom allows reflecting and evaluating faster during the lesson. The concluding part of the thought process improves in quality as well.

An important part of working in a group, where it truly differs from individual work, is the possibility to organize pairs or small groups of students during the lesson. Dividing the class provides the following advantages:

- It is possible to give students differentiated exercises (sorted by themes or according to difficulty level), organizing the most efficient tasks for each group of students.

- Each student may get the chance to express oneself as part of group work.

- Children can try out new roles (be the teacher, the assistant, the consultant) in the classroom. They can now learn more than the lesson itself. They can practice giving the help in similar ways to those in which they received it from the teacher. The students' experiences may also become a valuable resource for development and reflection.

2. The computer program "Chess for Overall Development"

The computer program, "Chess for Overall Development", was planned and realized as a current technological version of the ideas and methodological concepts making up the methodology of the same name. A crucial part of the planning process was the program's compatibility with the principles of the reflection and activity approach. The program, created as a powerful, resilient and convenient instrument, allows each student to progress along an individually constructed developmental path. Teachers using the program can quickly and accurately understand and define the limits of the zone of proximal development.

The program is a web application. The address is http://chess-od.com. It works with any computer, assuming it has a browser and a stable Internet connection. Working with the program does not require additional resources, other than the browser. The program offers the user a wide array of functions and is equally user friendly for teachers and students. The chess problems in the program are also adapted to fit the user.

The program's menu consists of:

- Student
- Teacher
- System
- Language selection

The sections "Student", "System" and language selection are available for every user whereas the section "Teacher" is only available to registered teachers. The following is a detailed overview of each section.

3. Student's Menu

The section for students becomes available after entering the "Student" section in the menu. It consists of the following segments:

- Stage 1 - Problems for identifying a square on the chessboard
- Stage 2 – Problems for identifying a line on the chessboard
- Stage 3 – Problems for identifying square configuration
- Stage 4 - Problems for identifying a square where lines intersect
- Stage 5 – Mate-in-one problems

- Stage 6 – Mate-in-two problems
- My Progress
- Manuals
- Rules of Chess

The following is a brief overview of the content in each of these segments.

The six stages are part of a set of problems for the student. The first stage is an introduction and the problems it deals with fit young children, as well as for children diagnosed with intellectual disability. The sixth stage includes problems, which may challenge chess masters when they reach its most complicated part.

The main idea connecting all stages is the gradual change in complexity, advancing from simple to complex problems. The different stages are interlinked, making a clear, direct logical connection between stages.

Each of the stages includes subdivisions. Each stage includes a certain number problem types. Each type offers the user several levels to choose from when solving the problem. This structure allows the student to choose from a list of 167 levels of complexity when learning the material. However, the student can advance to the next level only after completing all tasks on a given level successfully.

The main idea behind the structure of each stage is problem solving which gradually increases in difficulty, ranging from simple to complex. Every new stage is always harder than the previous stage. Having said that, it is important to note all stage types are interlinked by the same general idea: problem solving should gradually transform. The student should gradually stop solving problems on the material plane (when it is offered that the student uses an entire array of learning aids) and gradually begin working in the "ideal" plane, having a mental image of the problem (without the use of additional material; furthermore, the student sees nothing on screen but a white square, symbolizing the chessboard).

The following is a brief overview of the unique features each of the six stages contains.

"Stage 1 - Problems for identifying a square on the chessboard" are the simplest set of problems. This is, basically, an introduction. This stage offers the user four types of problems:

I. Square colour (including 8 levels of difficulty)

II. Square name and colour (including 5 levels of difficulty)

III. Piece's position (including 4 levels of difficulty)

IV. Configuration of squares (including 6 levels of difficulty)

The problems of the first stage are for students who need to understand the chessboard's structure, the system establishing names for each square, the knowledge required to use the system and determining the color of a square by its name. Problems of the first type offer finding a specified square on the chessboard (e3, for instance) and determine its color (e3 is black). The second and third types require solving the same problem from an opposite perspective and determine the name and color of a specific square already indicated on the chessboard. The fourth type requires that the student enters a series of names of four squares, according to a specified color (black or white).

"Stage 2 – Problems for identifying a line on the chessboard" is where the student learns about the lines on the chessboard. The student should understand terms such as "file", "rank" and "diagonal". This stage consists of three types:

I. Files and ranks (including 8 levels of difficulty)

II. Longest diagonals (including 2 levels of difficulty)

III. Long and short diagonals (including 8 levels of difficulty)

The names correlate with the functions of these types. The first type allows the student to understand and use files and ranks on the chessboard. The students should be able to determine a file or rank crossing a specified square. The student should then determine all the squares, which make up a line (for the first and second levels), followed by determining the first and last squares of a line (on levels 4-8).

Upon reaching the third level within the first type of problems, the student is offered to take a test. It is composed of four questions to begin with, regarding files and ranks. A certain part of these questions has more than one correct answer. The fifth question documents the student's self-evaluation and offers the following options, when answering the question "In your opinion, did you do well on the test?":

- Badly
- So-so
- Good
- Perfect

After the student completes this test, the program displays an objective evaluation of the test scores, compared with the student's subjective evaluation. In case the test score is evaluated as "Perfect", the program allows the student to begin the next level (however, in case the score is lower, the test should be taken again).

The second and third type of problem is analogous to the first type, however, the theme is the "diagonal" line and the knowledge required to work with it. The student

tries to specify the longest, long or shortest diagonal line, crossing a specific square on the chessboard, indicating all squares of the diagonal or just the first and last square.

On the third level of the third type of problems, the student is required to answer thirteen questions, testing the student's understanding of the concept "diagonal" and of the quantity of squares each diagonal line on the chessboard contains. The last question in the test documents the student's self-evaluation.

"Stage 3 – Problems for identifying squares configuration" is a more complex version of the same problems, showing the idea of increasingly difficult tasks in practice. This stage consists of three problem types:

I. Orienting oneself within the space of the chessboard (including 5 levels of difficulty)

II. Ability to see squares configuration (including 8 levels of difficulty)

III. Tracing how a piece moves (including 5 levels of difficulty)

Each level of the first type includes eight steps. Each of the steps may consist of the following problem types:

- Squares at the center of the chessboard (white squares only, black squares only, all squares)
- All the white squares or all the black squares where white pieces are in initial position
- All the white squares or all the black squares where black pieces are in initial position
- All the white squares or all the black squares on whites King's or Queen's flank
- All the white squares or all the black squares on blacks King's or Queen's flank
- All white diagonals amounting to a specified number when counting squares (2-8)
- All black diagonals amounting to a specified number when counting squares (2-8)
- All diagonal lines on the chessboard amounting to a specified number when counting squares (2-8)

Problems of the second type help the student understand which squares are controlled by each piece on the chessboard in accordance with the piece's location. Every level of difficulty within the set of second type problems consists of six steps. Each step revolves around a single piece. For example, the student should specify which squares the Knight controls, in case it is on square e5.

Upon reaching the third level of the second type, the student goes through a test on the way the chessboard functions, on understanding squares, controlled by various chess

pieces when located on different squares. All questions in the test are mirrored in previous problems the student has already solved without a single mistake. The test's final question documents the student's self-evaluation.

Every level of difficulty within the third type consists of six steps. Each step revolves around a single piece. The student should trace a series of moves. Each piece moves four times per series, while the program requests indicating the next square. Here is an example of a possible problem:

> "Place the white Rook to d4. Imagine that during the game Rook made 4 moves:
>
> 1. to the right to 2 squares
> 2. upwards to 4 squares
> 3. to the left to 3 squares
> 4. downwards to 1 square
>
> Trace the piece's path, mark the squares that the piece passes with a green chip, click on the virtual keyboard to enter their names and colour".

"Stage 4 - Problems for identifying a square where lines intersect" is a transitional stage. It is designed to help the student move away from solving developmental chess-alike problems to solving real chess problems. This stage consists of the following six types of problems:

I. Safety of the squares in the starting position (including 4 levels of difficulty)

II. Checking the King (including 8 levels of difficulty)

III. Defending against check (including 8 levels of difficulty)

IV. Ways to attack the opponent's pieces (including 8 levels of difficulty)

V. Ways to defend from an attack (including 8 levels of difficulty)

VI. Double Attack (including 8 levels of difficulty)

Problems of the first type are there to teach students how to recreate initial position in chess, showing the number of pieces defending each of the pawns. The fourth level of difficulty for problems within the first type is a test. The student should answer four questions, regarding the initial position in chess and the student's understanding of how pawns are defended. The test's final question documents the student's self-evaluation.

Problems of the second through sixth types are real chess problems offering the student problems in accordance with the name of each problem type. In each of these types, the

student gets a demonstration of a position on the chessboard. The position is shown to the student for a limited amount of time, depending on the number of pieces. The amount of time has been determined by way of experiment. The average amount of time required to remember a position is six seconds per piece, in case the person remembering is a healthy adult. Therefore, a position including four pieces is shown for 24 seconds, whereas a position including 13 pieces is shown for 78 seconds. When the time elapses, the position is no longer visible. When working with problems on levels 1-3, the student should recreate the position shown to him and make the right move (threatening the opponent's King with check, for instance). Levels 4-8 require making the right move at once.

"Stage 5 – Mate-in-one problems" consists of three problem types, each of 8 difficulty levels, divided in accordance with the difficulty level of each step:

I. Elementary problems

II. Difficult problems

III. Advanced problems

The logic required to solve these problems is analogous to types 2-6 of the fourth stage. The student should try to remember the position when working on levels 1-3, recreate it and place the pieces on the chessboard, then make a mate-in-one. Levels 4 and higher require remembering the position and then making the right move for a mate-in-one. Let us note that a specific problem on the fifth stage may have more than one correct answer. In this case it is necessary for the student to show all the correct answers.

"Stage 6 – Mate-in-two problems" consists of five problem types. Each type consists of 8 difficulty levels:

I. Elementary problems

II. Problems for various defenses

III. Problems for various attacks

IV. Difficult problems

V. Advanced problems

This stage is similar in structure to the previous stage, having levels 1-3 repeat position recall, recreation and, finally, solving the problem. Levels 4 and higher require remembering the position and solve the problem immediately. The problems in this stage differ from the fifth stage since they are mate-in-two problems. They require that the student predetermine the first move, the opponent's move and the final move, ultimately reaching checkmate.

The structure of the process is similar to mate-in-one problems since mate-in-two problems may also have several correct answers. The student should indicate all the correct answers. This stage has some problems with up to eight possible ways to develop the initial position, meaning that there are eight possible answers. The student needs to indicate each answer in turn and only when all possibilities are taken into account, the problem is solved.

In addition, stages 5 (Mate-in-one problems) and 6 (Mate-in-two problems) include a system of interactive help. The system is available for use in case a student encounters difficulty solving the problem. The system is a list of nine questions, reflecting on different ways to solve a specific problem. Each question allows the student to submit several possible answers. These answers are then marked true or false. After answering the questions, the student may choose to either continue working on the problem or stop trying. If the student decides to stop, the program offers to show the student the right move, which was not reached during the learning process, or to solve the problem later without seeing the answer.

When the student chooses **"My Progress"** from the menu, the program offers a detailed problem-solving history for all six stages. The student can review the information independently or with the teacher, note the date and time, see how much time it took to answer specific questions, review mistakes, test results and compare the program's objective evaluation with self-evaluated results. Finally, the student may see which problems are solved and which are unsolved.

When the student chooses **"Manuals"**, the program offers detailed manuals for each of the program's six stages. Instructions include illustrated descriptions, explaining the aim of every problem and nuances having to do with problem solution.

The last item of the "Student" menu is **"Rules of Chess"**. It includes a brief illustrated list of rules, descriptions of each piece (and possible moves with each piece), possible outcomes of various games and, finally, special moves (such as castling, en passant and promotion).

4. Teacher's Menu

The teacher has to register in order to start working with the program. Necessary fields are: teacher's name, city and country of residence, email address, and unique password. After receiving a confirmation email, the teacher may enter the program.

The teacher's menu consists of the following items:

- My Profile
- My classes
- Manuals

The teacher can view and edit his/her own profile under the "My Profile" item, changing the name, city, country and password required to enter the program when necessary.

The methodology assumes the teacher is working with children at school and so it offers the options required for this type of work. The menu item called "My Classes" allows the teacher to create virtual classrooms, adding students when needed. In addition, the teacher can add other teachers to the class since the methodology assumes teachers will work in pairs or even bigger teams. The teacher can edit each class, changing its name, for instance. It is also possible to transfer a student from one class to another. Furthermore, it is possible to delete the records of students who stopped attending classes.

As it turned out, registering the students is a real issue. The usual registration process assumes the user has an email address. But there are two problems here: the teacher should be able to follow the students' progress and control their work using the program and most young learners in the elementary school do not have an email addresses yet. To solve these problems, the teacher should add every pupil manually to the virtual classroom, and the program creates a unique key for each new student upon adding. The students identify themselves using this key within the system and their teacher is able to track their progress.

The **"System"** menu item includes the following:

- Contact Us
- About the Software
- Share your Feedback

The first and second parts of this menu are clear as they are. The third, "Share your Feedback", offers the user a form to fill out, consisting of seven closed questions and one open question. The teacher is requested to evaluate the program, provide impressions and feelings regarding program use and, in case he or she wish to do so, send any requests or comments to the program developers.

5. Initial Results of Computer Program Approbation

The program "Chess for Overall Development" is currently undergoing approbation testing. It is happening in many schools, colleges and universities throughout Moscow and other Russian cities. The users testing the software are school students (grades 1-11), university students and teachers. The software is also undergoing tests in a home for mentally disabled people, in a rehabilitation center for seriously ill children, and in RCCH (the Russian children's clinical hospital), focusing on children with severe somatic disorders going through long periods of treatment. The program also has users located outside of Russia. The following information is a summary of the observations the developers made while testing the program.

In our experience, the program is very popular among school students. The younger the students, the more enthusiasm and amazement it makes the students feel. Many students from grades 1-3 happily attend chess clubs at school, where they use the program. Some of these students signed up for chess club willingly, after asking the school administration to participate. Other students arrive spontaneously, drawn to the chess club by their classmates who already attend. Some children attend the lessons every time, whereas others attend irregularly.

The youngest groups of children attending these lessons always create a dynamic, emotional atmosphere in the classroom. Children are interested and engaged in learning with the program, not hiding their feelings. Their emotions range from great happiness when they succeed in solving a problem to deep sorrow when they fail.

Some of the youngest learners, including first grade students, show independence and persistence when they overcome difficulties, refusing the teacher's help and eventually succeeding. Other children make the most of the convenient psychological atmosphere to interact with the teachers and their assistants. These children ask for help in solving the problems they are truly and clearly capable of completing without help. The majority of children do not fit into these groups. Most children function in their zone of proximal development and request the adults' help only when they are not capable of solving the problem themselves.

The approbation process involving the youngest learners resulted in some unexpected problems for the developers. It turned out some students do not know the beginning of the ABC and cannot repeat its beginning (letters A to H). This makes solving even the simplest problems in the introduction stage impossible. Studying the letters using a wooden chessboard and remembering them did not bring the desired results because the chessboard has uppercased letters marking the squares whereas the program uses lowercased letters. The children learned the capital letters, finding the right square on the wooden chessboard with relative ease. However, when they had to adjust to the change in letter case, they experienced great difficulty.

In addition, another serious obstacle was the children's low level of Russian language. Some students were not able to read. These children are capable of strong logical thinking, but are not able to complete the simplest tasks because they cannot read and therefore understand the instructions.

Children who knew the ABC and could read the instructions (even if they read slowly or divide words by syllables) made normal progress, as expected by the program developers. Each student progressed according to his/her own developmental path, requesting an adult's assistance when necessary.

It is also interesting to add that the lessons involving the youngest learners within the framework of various chess clubs resulted in several discoveries made by the children themselves. One of the popular practical tasks, for instance, turned out to be drawing a scheme of the chessboard on checkered paper. This task was not a part of the methodology

or the computer program. This specific task also revealed itself as flexible. It is possible to alter the level of difficulty, according to developer's logic, making it harder and harder to complete the task. The children start by simply drawing a grid of any size. They proceed to compare the drawing with the wooden chessboard and create a version of it on paper. They draw a scheme consisting of 64 squares, checking the original board all along. At the end of the process, they color the squares accordingly, adding letters and numbers. This type of task could potentially be completed without an actual chessboard, using one's memory alone. Another observation is that children sometimes shift from solving problems in "Chess for Overall Development" to solving them on an actual chessboard. Sometimes, the students make the shift from using the software to playing an actual game with an opponent (teacher or student) or the computer, using a built-in chess program.

The chess clubs participating in the program also have groups for middle school students as well as for high school students who use the program. Lessons with these children show different emotional dynamics. Students of these age groups mostly tend to focus on their work just like adults. They are not as emotional as the younger children are and tend to aim at success. They go through first stages of the program faster than the younger children do, but playing an actual game of chess is as popular among them as using the program.

College students form the third group of testers. The program's developers were surprised to find that they too have occasional difficulties solving problems of the first few stages. One young college student tried solving the test belonging to the second stage repeatedly, for a long time, with no result. He failed every time. The test involved answering questions about diagonal lines. He was amazed when, following his teacher's advice, he closely examined the structure of the chessboard and found that the chessboard lacks one central square, and the amount of diagonal lines of the same color is an odd number!

For this moment approbations are in progress and final results and conclusions have not been processed yet. However, it is already clear that the "Chess for Overall Development" program matches expectations very well. The users' experience results not only in better knowledge of the game of chess, but also in improving students' overall development. It is particularly evident when examining users who regularly work with the program (at least once a week for several months). The program developers noticed that when these users, regardless of their age, continue using the program regularly they improve spatial cognition and memory as well as their ability to compose mental images of possible actions. Some of these users shared their experience willingly, initiating contact, stating that their abilities and ways to deal with difficult situations in life have changed because of the program. They use skills learned while using the program to solve problems in other areas (not related to chess or education at all) and that, in the developers' opinion, is the key indicator showing their overall development. The developers are currently working on creating and integrating a system of psychological diagnosis into the program so that it becomes possible to document the changes mentioned above objectively.

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