Imagine – children programming for beginners

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Abstract

The distance course of children programming Imagine for beginners is now realized within Bratislava region. Fifty IT teachers of the primary schools learn the bases of programming – they create simple computer games and education tools. We want to introduce several clues used by design and realization of the course as well as to inform about possible problems by distance education of the teachers.

1. Preface

The ability to find effective problem solution is highly appreciated in the present society. Algorithmic thinking – decomposition of problem into smaller elements and description of single steps how to solve them – should be thus developed from early childhood.

Computers and computer games have become stable part of children world. But children also love creating new stories and games besides playing. At time when higher programming languages have been developed, several children programming languages appear. One of well-known tools for children is Logo – the “speech” of the turtle-robot. The programmer – a child as well as an adult - can use the turtle as a graphic pen.

The modern version of Logo called Imagine is freely accessible at most Slovak schools. However, only small number of the children knows Imagine. We find one of the main reason in the absence of quality education material and support for the IT teachers. Therefore we have designed and realised the e-learning course of children programming for IT teachers – beginners in Imagine environment.

The course is the part of Pilotný projekt vzdelávania učiteľov, školských inšpektorov a študentov v oblasti IKT, profesných a komunikačných zručností na PriF UK in cooperation with Bratislavský samosprávny kraj Vecit Centre has gained irretrievable tribute from European Social Fund.

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2. The design of the course

We chose Imagine as a way how to achieve first skills in children programming because

- Logo supports constructive approach to problem solution
- Imagine enables more than classical Logo – the programmer can “clone” turtles or create families with similar properties
- Moreover, turtles can react to the events. Parallel programming is also possible. Imagine is designed to acquire the basics of Object Oriented Programming.
- Imagine is also the environment for using multimedia applications – the user can compose the music, use video or internet in own programs

We have specified several preliminary IT skills of our potential students:

- student can work independently with computer – this condition includes the ability to open, read and save files, the compression of files
- student uses Internet to search the information and to communicate via e-mail

Then we have defined the output profile of our students – the sample task that the student has to be able to solve independently (This task will be used as the final exam for the successful students of the course.)

The final content of the course is divided into 4 modules and revision lessons.

Fig. 1 The modules of the course

The modules game-creating and Object Oriented Programming are closely interconnected.

The content of the course relates to the newly published workbook for the pupils of primary school called 1.zošit z programovania [1].

2.1 Structure of the lessons

Each lesson includes
• the education text – both in hypertext and printable format
• the homework – it involves in most cases the creating of the small application
Several lessons include illustration projects or unfinished projects – student can complete them.
The education text consists of the sample exercises with solutions and many tasks meant for independent practice of the students.

2.2 Types of tasks
We tried to include several types of tasks developing various skills at our e-students
• the highest level - ability of autonomous programmer thinking and the synthesis of the knowledge is represented by the tasks like Create the program or Define the command
• the ability to read and understand unknown solution is supported by the tasks like Fill in one command to draw..., Fill in the count so as the turtle draws this shape or Match the figures and the programs
• unfinished project is the kind of task developing both previous skills (Colouring book, party games)
• we try to give the tasks education context and to evoke the ideas for designing new education applications in our students

Fig. 2 Define the command to draw this picture – the autonomous programming

Fig. 3 Fill in the command opakuj _ [sipka _ ] count and one command so that the turtle creates this picture

The number of the tasks differs from lesson to lesson. The tasks in some lessons require more time spending by clicking and setting up the properties of the environment – the result is however quite interesting.
Finally we determined various way of feedback – we combined the survey of the knotty tasks with self-assessment – personal feelings about own skills.

3. Realization of the course

We used moodle as the e-learning system supporting education. We can
• publish the education material, supportive projects and hyperlinks
• design the tests and surveys – moodle offers a simple way of assessment and collection the results of our students
• provide the feedback for students' homework
• administer the students’ records effectively

3.1 The choice of communication tools brings some problems

We use discussion forum as the main communication tool. The advantage of this approach is obvious: students can advise each others before the tutor answer their question. This form of communication helps to development of collaboration and personal relationships within virtual class.
However, the entry questionnaire showed that the majority of the teachers use e-mail (35 people mark it with 5 points – the most important way of communication). On the contrary, 27 students mark discussion forum with zero – which means they don’t use this communication tool. This fact can be related to the average age of the teachers.
We accepted personal messages via moodle at the very beginning of the course. It was not very reliable media – some messages disappear, some students wait a long time for the answer. The students asked same answers and the feedback has sometimes lost – this led us to decision to disable messages in moodle. This solution brought some effect – after several weeks the forum awoke and people discuss more. We take still turning the messages off after several weeks a bit unprofessional solution.

3.2 Projects raise motivation

Imagine enables to export own programs to .iip format and to publish it on the webpage using special plug-in. We use this possibility in several ways
• to illustrate the notions described in chapter (interactive project Polygon shows both the code and responding drawing of the turtle – the settings can be changed by sliders)
• to replenish the assignment of the task - showing the final effect (demo version) after correct solution
• to create the gallery of open tasks solution – students can learn from each other’s work
• to attract students’ attention to the lesson
3.3 Tests bring change and time saving

Programming is rather time-consuming activity, especially for
the beginners with little or no skills. The homework includes the
programming of a simple application in most lessons. We chose
different approach in the revision lesson: the students should fill
the test containing the questions with the selection of the answers, the sorting task, the question with the only gap-fill task. The survey has shown that students spent about 15 minutes over this test.
We plan to draw up some voluntary self-tests to the first five
lessons.

5. Evaluation of the first usage of the course

Fifty teachers with various IT qualification are now studying in
the course. They are divided into five groups – each group has
different tutor, but they share discussion space and education
materials. The feedback is
As we mentioned in the part 3.1, we faced some communication
problems during first lessons. Here we present a few proposals
that can lead to more effective using of various way of
communication. Some of our ideas are specific for the courses
of programming.
These activities have not been pre-tested and therefore we
cannot state whether they are well designed. They require
watchful consideration and preparations. We hope they will
provide some ideas to think over.

5.1 Team task

The particular separation of the groups (we use the mode
“visible groups” in moodle) can help to strengthen the
relationships between the members of the group. Activity where
the students create huge project together – everybody solves one
module of the project -makes the participants of this activity to
communicate with the others (they have to organize their work)
and perhaps ask someone for help with some technical issues.
The students become in this way a part of programmer group.

The issue appears whether this approach can be used to the
students which differ by age and fancy to cooperate.

5.2 Pre-programmed online activity

Imagine allows to use the net – the online activity where student
has to cooperate to win can be very successful means. However,
the definition of the term cooperation and the computer games
based on communication are quite rare and it requires much time
to design and create good cooperation activity.
In future we will be glad to prepare the program in which two
students control the turtle and the turtle has to go through the net
of streets – the control after the command execution will be
passed from a student to his online partner.

5.3 Change of assessment

The simplest way how to support communication via forum is to
appreciate it, i.e. the student can scored from his articles or
questions via forums.
We have also tried to reverse the position of tutors and students
by offering students chance to give points to the tasks of the
lesson. Many students made use of this opportunity. Besides we
obtained fast feedback to the problem places in the lessons.

6. References

1. A.Blaho, J.Kalaš: 1.zošit z programovania, SPN 2005
2. Pasch, M., Gardner T.G., Langerová G.M, Starková A.J.,
   Moodyová Ch.D.: Od vzdelávacího programu k vyučovací
   hodine, Jak pracovat s kurikulem, Portál 1998
3. Didaktika vytvárania e-learningových kurzov
Below I have provided you with some of my favourite commands which in my experience work the best, they are clear and to the point which makes it easy for a child of any level to get what you are saying! In the below video you will see how I: Introduce myself and ask what the student’s name is. How I show the student that I am listening for an answer. How I command the student to repeat after me. How I encourage the student to speak in full sentences instead of single words.