

ISMGE 2020**II International Scientific and Practical Conference "Individual and Society in the
Modern Geopolitical Environment"****HUMAN-COMPUTER INTERACTION IN VIRTUAL
EDUCATIONAL ENVIRONMENT: EXPERIENCE OF MOSCOW
STATE LINGUISTIC UNIVERSITY**

Innara Guseynova (a), Alexey Gorozhanov (b)*, Elena Kosichenko (c)

*Corresponding author

(a) Moscow State Linguistic University, 119034, 38 Ostozhenka St. Moscow, Russia, i.guseynova@linguanet.ru

(b) Moscow State Linguistic University, 119034, 38 Ostozhenka St. Moscow, Russia, a.gorozhanov@linguanet.ru

(c) Moscow State Linguistic University, 119034, 38 Ostozhenka St. Moscow, Russia, e.kosichenko@linguanet.ru

Abstract

Being a many-faceted process human-computer interaction can take different forms, like cooperation, rivalry, struggle, subordination, and – to a certain extent – friendship. Human-computer interaction in teaching foreign languages dates back again to the middle of the 20th century when a number of projects were launched and the first learning management systems appeared. The authors suggest a model of human-computer interaction in online linguistic education that includes five components: technical platform; method of online teaching foreign languages; authors of teaching materials; teaching staff; managing body. The most important component seems to be the method. Each component provides its own type of human-computer interaction, including the use of special software that helps speed up the process of making online courses and increases the efficiency of the learning management process. In conclusion an example of two online courses is given that are similar by the learning content but are completely different by the level of computerization involved. Thus, using different forms of human-computer interaction can create a “scaling” effect on the same learning material.

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1. Introduction

Understanding that the computer and the human have much in common began to take shape in the second half of the 20th century, particularly in the works of the outstanding mathematician A. Turing, who in 1950 asked the question: “Can machines think?” (Turing, 1950, p. 433).

Being a many-faceted process, human-computer interaction can take different forms, like cooperation, rivalry, struggle, subordination, and – to a certain extent – friendship.

2. Problem Statement

Like many other spheres of life, the field of education requires constant usage of the computer, which seems convenient to many people and is deemed acceptable as long as the computer remains subordinate to a person. The computer is used as a typewriter, a photocopier, an organizer, a means of presenting information, etc. New trends in education also inevitably involve the computer; for example, this refers to gamification, which is using games in education, or learning while playing (Evdokimova, 2018, p. 2417).

Conversely, as soon as the topic of education is brought up, the computer is immediately regarded as an intruder, and its participation in the learning process triggers resentment and rejection caused by general concern that in the very near future machines are bound to replace people in their workplaces.

3. Research Questions

It may be argued that computerization is not about replacing a human by the computer but about the obvious fact that it is a professional – well aware of the subject and adapt with technologies and teaching methods – who is to write and to update programs. Having replaced the horse, automobiles have not yet replaced the driver. Moreover, drivers now treat their cars as loyal friends, personifying them, besides horses did not vanish as soon as autos arrived.

It should also be pointed out that opponents of computerized learning show a lot of concern about the fact that a teacher will gradually develop into a software engineer as the variety of tasks the computer performs is great – from typing and making copies to planning people’s time.

In the field of linguistics, the human-computer conflict is quite conspicuous and goes far beyond the classroom. A good example is machine translation with its fast developing automatic and automatized systems able to produce more and more adequate translations. It needs to be stressed, though, that this kind of activity cannot be done solely by the computer, but demands the immediate participation of a human.

4. Purpose of the Study

In our opinion human-computer interaction can be productive if regarded as interaction of cooperation aimed at achieving the ultimate goal. No doubt that the leading role in this cooperation belongs to people, whereas the computer is to tackle problems it is best at, like big data processing,

multiple presentation, protocolling, random generation of data from databases, data expertise and a lot of other functions.

It is important to stress that we here argue for cooperation, not subordination, and regard the computer as an important tool that serves to support the learning process. It is three-dimensional and involves the student, the teacher and the computer in different proportions. It must be specified that the computer is used not only to assist the teacher in the classroom but also to do all kind of preparatory work and drive both the teacher's and the learner's development.

5. Research Methods

Human-computer interaction in teaching foreign languages dates back again to the middle of the 20th century when a number of projects were launched with PLATO being one of them (Woolley, 1994). For this purpose engineers and scientists developed special algorithms of learning: linear program (Skinner), branching technique (Crowder), adaptive algorithm (Pask) (Bird & Di Paolo, 2008, p. 197; Sampath et al., 2008, p. 268; Stern, 1983, pp. 306-307). Today more and more computer programs are used to teach foreign languages, among which are learning management systems and mobile applications (Magal-Royo et al., 2017; Mellati et al., 2018; Ortiz & Green, 2019; Pereira, 2019).

6. Findings

6.1. Model of human-computer interaction in online education

Let us now thoroughly consider each component of an online educational human-computer interaction model that was devised at the Laboratory for Fundamental and Applied Issues of Virtual Education at Moscow State Linguistic University (Gorozhanov et al., 2018). The model consists of the following elements that are closely interconnected and are hierarchically arranged:

- technical platform;
- method of online teaching foreign languages;
- authors of teaching materials;
- teaching staff;
- managing body.

It ought to be stressed that the article focuses on individual, not group forms of teaching foreign languages, which means that each teacher works with one student at a time, thus the model describes the student–teacher–computer cooperation from the standpoint of teaching (Politsinskaya et al., 2019, p. 3). The chosen approach does not imply that the student's role in the virtual classroom is minor or totally irrelevant, but is adopted as a convenient way of considering the problem in question.

It is worth starting with establishing the managing body which will help to decide on the content and the hierarchy of the remaining four components. It means that the managing body is the underlying element of further development of online teaching foreign languages (Lizunkov et al., 2018). The managing body staff are to be competent both in foreign language teaching and in selecting, devising methods of online teaching and providing guidance.

Apart from being knowledgeable and well aware of foreign language teaching methods the managing body staff are to be adept with modern technologies so that they could decide on the appropriate technical platform and be able to choose between an already existing solution or develop – with reliance on the technical task devised by the managing body – a software product to suit the needs of a certain student.

Despite the dominance of the second component over the first one, the two are closely connected as devising teaching methods suggests either relying on the technical capacity of existing products or at least taking into account the technical potential of modern software (Shamne et al., 2019). It is important to determine the parameters for its development in case there is urgent necessity to come up with an original solution. It has to be stressed that choosing a suitable technical platform can be the responsibility of either the managing body or an expert in foreign language didactics who is in charge of developing the method and is assisted by the managing body.

It is required that authors of teaching materials should be guided by the method and should well realize the full potential of the technical platform, which will enable them to use this software to the utmost while preparing online courses. It is quite acceptable that the author of the method acts as an author of the related courses. Teachers who use the teaching materials prepared with the help of a certain method are expected not only to know how to make this method effective but also to be skillful enough to make the most of the technical platform and use its potential to their own and their students' advantage. Engagement of the teaching staff falls into the responsibility of the managing body. Both the authors of online courses and the authors of original methods are to have a chance of using the online courses based on the method in the virtual classroom.

Finally, a managing body member can be the author of a method, which means he/she can act as an author of online courses as well as a teacher.

It should be specified that within the framework of the model in question administration and development of the technical platform is exercised by the managing body. The staff members who are in charge of each component have quite defined responsibilities. Those responsible for the technical platform are to maintain its sustainability and to adjust it, following the logic of the method and the guidance of the managing body (Shamne, 2019).

Authors of original methods are responsible for further development of the theoretical foundation with reliance on the empirical data received in the course of education from the authors of teaching materials and from teachers. They are also to take care of providing recommendations for the system administrator of the learning management system with a view to improving it.

Authors of online courses are also responsible for their further development – that is, taking into account the empirical data that they receive from their colleagues engaged in teaching students, on the one hand, and recommendations from the author of the method, on the other hand, they are expected to come up with ideas concerning the development of this or that online course.

Teachers engaged in online education hold consultations in videoconferencing mode, track their students' performance, assess open tasks, provide recommendations on work and time management, contribute to the work of authors by correcting mistakes and slips. In doing this they are guided by their own expert opinion and their students' feedbacks.

The managing body staff are in charge of a whole range of activities that consist both in managing the education process (arranging formalities, recruiting students, managing finances) and providing instructions for the staff responsible for the remaining four components of the model. Thus, all components not only interact but influence each other in the way they function and are subordinate to the managing body. The latter is not merely an administrative structure as the name suggests but an intelligence center that directs the other participants in the education process contributing to the organization and development of online teaching foreign languages.

It's worth mentioning that the model we here describe is effective within the framework of institutional education that foresees the involvement of a teacher who is an expert in a particular field, and is not restricted to situations of peer-to-peer interaction. It means that we here deal with a model of organizing and developing online teaching within an institution.

Describing each separate component, one cannot ignore that the second one (method of online teaching foreign languages) is the least computerized as it foresees the creation of an intellectual product, which brings to the surface the dominant position of human and the subordinate role of the computer in human-computer interaction. The most computerized is evidently the first component (technical platform), which is responsible for the software; the other components are of interest for the reason that they reveal the nature of human-computer interaction.

6.2. Software Solutions

First of all, authors of teaching courses, the teaching staff and the managing body deal with the technical platform which is the basis of online learning, both institutional and spontaneous. The nature of this interaction can be different because these three elements can use different programming tools. When writing an online course, the author can use not only tools of editing teaching materials but also resort to other software tools that speed up and facilitate his/her work. We further bring up an example of an application written in Python programming language that was developed at the Laboratory for Fundamental and Applied Issues of Virtual Education at MSLU to convert the prepared TXT file into LMS Moodle XML glossary file (please refer to Listing 1):

Listing 1

```
f = open("text.txt", "r", encoding="utf-8")
text = f.readlines()
f.close()
xmlcode = """<?xml version="1.0" encoding="UTF-8"?>
<GLOSSARY>
<INFO>""
xmlcode += "<NAME>" + text[0][:-1] + """</NAME>
<INTRO></INTRO>
<INTROFORMAT>1</INTROFORMAT>
<ALLOWDUPLICATEDENTRIES>0</ALLOWDUPLICATEDENTRIES>
<DISPLAYFORMAT>entrylist</DISPLAYFORMAT>
<SHOWSPECIAL>1</SHOWSPECIAL><SHOWALPHABET>1</SHOWALPHABET>
```

```
<SHOWALL>1</SHOWALL><ALLOWCOMMENTS>0</ALLOWCOMMENTS>
<USEDYNALINK>1</USEDYNALINK><DEFAULTAPPROVAL>1</DEFAULTAPPROVAL
>
<GLOBALGLOSSARY>0</GLOBALGLOSSARY><ENTBYPAGE>30</ENTBYPAGE>
<ENTRIES>\n""
fori in range(1, len(text)):
    if text[i] == "\n":
        xmlcode += "<ENTRY>\n"
        xmlcode += "<CONCEPT>%s</CONCEPT>\n<DEFINITION>" % text[i+1][:-1]
        ii = i+2
        while text[ii] != "\n":
            xmlcode += "&lt;p&gt;" + text[ii][:-1] + "&lt;/p&gt;"
            ii += 1
        xmlcode += """"</DEFINITION>\n<FORMAT>1</FORMAT>
<USEDYNALINK>1</USEDYNALINK>
<CASESENSITIVE>1</CASESENSITIVE>
<FULLMATCH>1</FULLMATCH>
<TEACHERENTRY>1</TEACHERENTRY>\n<ALIASES>""
        iii = ii + 1
        while text[iii] != "\n":
            xmlcode += "<ALIAS><NAME>" + text[iii][:-1] + "</NAME></ALIAS>\n"
            iii += 1
        xmlcode += "</ALIASES>\n</ENTRY>\n"
xmlcode += """"</ENTRIES>
</INFO>
</GLOSSARY>""
f = open("glossary.xml", "w", encoding="utf-8")
f.write(xmlcode)
f.close()
```

With all this a prepared TXT file looks as follows (please refer to Listing 2):

Listing 2

New English-German Glossary

-

table

Tisch

This table is made of wood.

tables

Table

Tables

-
house
Haus
A house at the end of the street.
houses
House
Houses
END

The first line of the TXT file contains the name of the glossary with dashes acting as delimiters between different articles. Each dash is immediately followed by the name of the glossary article, then translation is provided, which is succeeded by a commentary and word-forms, the number of which varies.

Glossary adjustments are added automatically. As a result, there appears a “glossary.xml” file that can instantaneously be imported into LMS Moodle course (please refer to Listing 3):

Listing 3

```
<?xml version="1.0" encoding="UTF-8"?>
<GLOSSARY>
<INFO><NAME>New English-German Glossary</NAME>
<INTRO></INTRO>
<INTROFORMAT>1</INTROFORMAT>
<ALLOWDUPLICATEDENTRIES>0</ALLOWDUPLICATEDENTRIES>
  <DISPLAYFORMAT>entrylist</DISPLAYFORMAT>
  <SHOWSPECIAL>1</SHOWSPECIAL>
  <SHOWALPHABET>1</SHOWALPHABET>
  <SHOWALL>1</SHOWALL>
  <ALLOWCOMMENTS>0</ALLOWCOMMENTS>
  <USEDYNALINK>1</USEDYNALINK>
  <DEFAULTAPPROVAL>1</DEFAULTAPPROVAL>
  <GLOBALGLOSSARY>0</GLOBALGLOSSARY>
  <ENTBYPAGE>30</ENTBYPAGE>
  <ENTRIES>
<ENTRY>
<CONCEPT>table</CONCEPT>
<DEFINITION>&lt;p&gt;Tisch&lt;/p&gt;&lt;p&gt;This table is made of
wood.&lt;/p&gt;</DEFINITION>
<FORMAT>1</FORMAT>
  <USEDYNALINK>1</USEDYNALINK>
  <CASESENSITIVE>1</CASESENSITIVE>
  <FULLMATCH>1</FULLMATCH>
```

```
<TEACHERENTRY>1</TEACHERENTRY>
<ALIASES><ALIAS><NAME>tables</NAME></ALIAS>
<ALIAS><NAME>Table</NAME></ALIAS>
<ALIAS><NAME>Tables</NAME></ALIAS>
</ALIASES>
</ENTRY>
<ENTRY>
<CONCEPT>house</CONCEPT>
<DEFINITION>&lt;p&gt;Haus&lt;/p&gt;&lt;p&gt;A house at the end of the
street.&lt;/p&gt;</DEFINITION>
<FORMAT>1</FORMAT>
  <USEDYNALINK>1</USEDYNALINK>
  <CASESENSITIVE>1</CASESENSITIVE>
  <FULLMATCH>1</FULLMATCH>
  <TEACHERENTRY>1</TEACHERENTRY>
<ALIASES><ALIAS><NAME>houses</NAME></ALIAS>
<ALIAS><NAME>House</NAME></ALIAS>
<ALIAS><NAME>Houses</NAME></ALIAS>
</ALIASES>
</ENTRY>
</ENTRIES>
</INFO>
</GLOSSARY>
```

It has been empirically proved that the greater the size of the glossary, the higher the efficiency of the application, besides a TXT file can be prepared without Internet connection, whereas work with LMS Moodle glossary editor requires permanent access to the Net.

The example proves how effective a most simple application might be and how useful it is for people as it greatly assists them in their work sparing them a lot of mechanical movements and enabling them to concentrate on doing creative work. The reason for us here to bring up the problem of cooperation is that the computer is regarded as a human's assistant and his/her co-author in creating teaching materials.

In his work the teacher uses a number of tools, like programs that support synchronic communication (videoconference), embedded text editors (to assess open tasks), he also refers to subsystems that protocol the results of the student in order to construct his personal learning curve. In this case the computer acts as the organizer of the teaching process, it structures the teacher's work and supplies him/her with information so that the teacher could make decisions.

While interaction between the teacher and the computer is in most cases restricted by the educational virtual environment, the computer-managing body interaction is far more complex. This assumption derives from the functions that the managing body performs in the teaching process. At this

point we do not refer to cases when the managing body performs the function of the author of a certain method, the writer of teaching materials and perhaps even of the teacher. The thing is that besides being involved in the teaching process the managing body is directly involved in organizing this process, including financial management, in case an online course is not free. These functions fall into two main categories:

1. Administrative and financial management for students.
2. Administrative and financial management for the authors of methods, online courses and teachers.

Originally, we pursued the goal of optimizing the work of the managing body so that it could satisfy the needs of as many students as possible with the minimum number of managing body members. In other words, the initial proportion between the managing body staff and the number of learners is to be 1:100 with prospects for this index to increase many fold (Lizunkov et al., 2018).

It has been proved by practice that the most difficult part of online teaching is compiling reports, first on videoconferences during which the teacher consults students, second on assessed open tasks as this part requires that both the time and the date of the consultation and assessment should be registered. A report of this kind is to be provided monthly so that the teacher could receive a pay for the work done.

LMS Moodle is equipped with a special subsystem that protocols the exact time of consultations, the time when the task was assessed, the name and the family name of both the student and the teacher. However, a report covers either the whole period of time when the system is used or a concrete date, which makes compiling an overall report on events of the last 30 days difficult. It means that the managing body staff are to process the data “manually” by selecting the necessary dates and matching them with concrete teachers and students. Protocols videoconferences is supported by not embedded programming tools, thus, this information is not registered automatically, which triggers more problems. Manual protocoling requires that the teacher should make several screenshots during the videoconference and later send them to a managing body representative. Protocoling becomes difficult even at the point when the proportion between the managing body staff and the students is 1:20, which makes data processing complicated and causes quite a number of mistakes.

This circumstance conditions the necessity to upgrade the system so that it could cope with larger data flows, with the desirable result of 1:100. To help the situation we have now developed an application that processes the data and automatically generates reports within certain time periods.

To develop the application we chose the following tools: Python, PyQt Library and SQLite. As a result a stable version of the stand alone application with a graphical user interface has been developed.

Compiling monthly reports works as follows. The LMS Moodle log file is programmatically processed to detect open tasks and avoid duplication (in case the same task was assessed several times after corrections had been made by the student). Then dates of consultations fixed in the TXT files are programmatically selected from the whole list of consultations of a certain teacher. Finally, there appears a TXT file with a report that contains information for the whole period and for each teacher:

- the date, the time and the title of each assessed open task;
- the date and the time of each video consultation with each student;
- the overall number of consultations and assessments done by each teacher.

Thus, the task of the managing body is to monitor data about video consultations and include them in special TXT files. The rest is done by the computer that automatically generates monthly reports where the data are arranged so that they can easily be included in financial reports.

The application performs a number of other functions, like protocoling the number of video consultations received and the number of assessed open tasks done by each student in order to alert the managing body in the event of extra costs. It also keeps track of the schedule and the deadlines in each online course, thus helping the managing body to take administrative decisions.

Since we offer different online courses, we have enough reasons to assume that the computer contributes to each online course in a different way. This concerns mostly the teaching staff, as the amount of computerized work done by the managing body and the authors of courses remains basically the same regardless of the character of each online course (Shamne et al., 2019).

7. Conclusion

In conclusion, let us consider two online courses that are similar from the point of view of their content but suggest different shares of computer participation in the whole educational process. The online course of English Communicative Grammar was originally developed as a course with a high share of the teacher's participation, as it foresaw video consultations and "manual" assessment of open tasks. The evident advantage of this decision was the possibility of an individual approach to each student; however, the amount of work each teacher had to do meant higher fees students had to pay and the impossibility for the managing body to cope with several dozen students, let alone hundreds or thousands of students.

After modifications this program was converted into an advanced training course for English language teachers. This course offers guidelines that serve to help students not only brush up their English grammar and get more proficient but first of all to master teaching methods – the goal achieved through communicative tasks. Thus, the course has become both educational and illustrative. It does not suggest any video consultations with a teacher as this has been replaced by a final written exam that contains a task on English teaching methods. As a result, the training fees and the training time have been reduced and the number of students who can be trained at the same time has grown. The teacher now has to concentrate on assessing the final papers, the rest is done independently by the student.

Thus, the higher share of computerization and the lower level of human participation have served to achieve the desired effect, which we call "scaling" of the original online course, and to create possibilities of attracting more students.

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