Videoconferencing and Virtual Reality in the Context of Language Education

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Abstract

Classrooms no longer mean a room full of students, sitting on school desks, while listening intently to an instructor lecture before them. Technology has long changed that view of education. Videoconferencing and 3D Virtual Reality (VR) are discussed in the first section of the paper with emphasis on application for educational purposes. Relevant definitions, history, state of the art and potential for future use are touched. Then, three case studies from the Czech Republic are briefly presented. Two of them are ongoing joint projects of seven different institutions applying videoconferencing and Virtual Reality in English language courses for adults. More than 300 students from two regions of the Czech Republic, mostly working professionals, are benefiting from the trials of the newly created courses. The third case study is a successfully finished project organized by two institutions for several hundred students at six elementary schools. Language tutors working directly from the Philippines were conducting videoconference sessions for small groups of students. The potential of the Information and Communications Technology (ICT) together with cultural difference between the tutors and the students were notably exploited in the methodical materials created for the project in order to motivate students and to assist them to gain not only the communicative competence, but also additional skills required by the curricular reform. A summary of information on data collected through a questionnaire during the project follows, showing the level of acceptance of the method and perceived benefits among the involved students. Finally, a specific research question, whether involving foreign tutors through online tutoring is less suitable for lower grades (grades four and five, with students aged ten to eleven who just started learning the English language) than for higher grades based on their subjective perception, is analyzed.

***Keywords*:** Component; online tutoring; virtual reality; videoconference; English for Speakers of Other Languages (ESOL); English language; elementary school; adult learners; Philippines.

Videoconferencing in education

People may each think of something different when the word 'videoconferencing' is mentioned. Some will say that it is a boardroom full of people dressed in suits, holding business meetings. Others will say, it is a means to personally contact your loved ones when they are far away. Consider the Merriam Webster dictionary's description of videoconferencing, "It is the holding of a conference among people at remote locations by means of transmitted audio and video signals." (Videoconferencing in Merriam-Webster Dictionary, n.d.) Distance no longer becomes an issue when it comes to educating others because of this development, but how it began wasn't exactly easy. Videoconferencing was first demonstrated in the late 1960s. This technique, however, was very costly that it could not be used for mundane purposes. As a result, it wasn't until about three decades later during the 1990s that videoconferencing became standard technology, therefore providing most with the convenience to teach through their personal computers. Nowadays, video conferences can be used for teaching in various ways.

As mentioned earlier, one of the ways videoconferencing is used is through connecting remote students around the world to their teachers. For instance, students in China can learn English through their computers from an instructor perhaps in New York. That, though, is only at its basic level. At a higher level, instructors may provide virtual tours to students and give interviews. It also allows students to practice their foreign language skills with other students from different countries (Horton,

2008). These techniques seem to excite them even more, especially the younger students. Initially, some of them might not be completely motivated to learn. Although, upon realizing that they can do activities during class such as, touring an African Safari, interviewing a scientist in Japan, and having conversations with other students in Brazil, they become more inclined to learn and are further involved. That, no doubt has become one of the big impact technology has had on the different processes of learning.

Here are other ways videoconferencing can be ingeniously utilized. It can be used for: (1) Discussion of live events. (2) Labs and demonstrations. (3) Study Groups. (4) Guest Lecturers. For example, it can be quite expensive to take a whole class to Washington D.C. for a field trip to The White House. It would be more cost-effective to discuss the tour and political event held there with a professor who had physically attended it. It gives the students a comparable experience, as if they were there themselves. In addition, when it comes to labs and demonstrations, activities like taking a cooking class has been made easy. There's no need to drive anywhere. All that's needed is a computer and a student can learn to cook from his/her own kitchen at home. Moreover, laboratory experiments in a Biology or Chemistry class can also be demonstrated through videoconferencing.

Having a live demonstration of a frog dissection or a chemical experiment through a screen is not any different from doing it yourself. 'Study Groups' are also a great way technology has increased possibilities for students. Especially in large universities, students who live on campus sometimes find it hard to stay in touch with other students in their classes. It is much easier to contact each other to work on group projects with videoconferencing. They are able to avoid late projects or delays, even when their schedules are completely different. Lastly, it would be an extraordinary experience for students to listen to a famous guest lecturer right before them. But without the necessary funds, that hasn't become a possibility for some colleges. Today, videoconferencing with famous and prominent individuals has become popular. It takes into consideration, not just the financial abilities of an institution, but also the schedule and location of the guest lecturer(s) (Acacio, 2012).

The role videoconferencing has played has gone beyond simply to educate. Yes, it eliminates distance. Yes, it makes learning more exciting, but its impact has touched the lives of many at the same time. An excellent proof is detailed in a case study about the Haiti Medical Education Project (Vidyo USA, 2012). In 2010, a 7.0 magnitude earthquake had struck Haiti. It destroyed most of its medical schools and the number of trained healthcare professionals suffered with it. With a shortage of medical schools and healthcare professionals, it was difficult to create and execute a plan to solve this critical issue. The solution: a non-profit organization called the Haiti Medical Education Project (2014) trained Haitian medical professionals by connecting them to a team of medical experts through videoconferences. This had successfully helped to improve the conditions in Haiti. The education they received eventually rebuilt the country's infrastructures and in a way, its people's lives.

Virtual reality in education

What comes to mind when you hear Virtual Reality (VR)? Many would likely associate it with either a computer game or something scientifically or technologically related. Nonetheless, it is commonly referred to as a Virtual Environment (VE). Thus, regardless of whether one knows the meaning of the term or not, it is quite self-explanatory making the gist of the words more apparent. Numerous applications have been developed with this goal in mind. Even though scientists differ in their opinions on what exactly creates a 'true experience' in a Virtual Environment and no matter what words are chosen to refer to it, Virtual Reality or Virtual Environment, the main concept remains the same. Jonathan Strickland (Strickland, 2007) describes Virtual Reality as, "… using computer technology to create a simulated, three-dimensional world that a user can manipulate and explore while feeling as if he were in that world." Similarly, the Merriam-Webster Dictionary defines Virtual Reality as "an artificial world that consists of images and sounds created by a computer and that is affected by the actions of a person who is experiencing it" (Virtual Reality in Merriam-Webster Dictionary, n.d.).

In contrast to these broad definitions we may name more strict definitions. Jonathan Strickland continues, that Virtual Reality in general "... should include: (1) Three-dimensional images that appear to be life-sized from the perspective of the user and (2) The ability to track a user's motions, particularly his head and eye movements, and correspondingly adjust the images on the user's display to reflect the change in perspective." (2007) Similarly, according to Wickens, Virtual Reality is said to have five main critical components. These are defined as the following: (1) 3-D perspective; (2) closed loop interaction; (3) dynamic rendering; (4) enhanced sensory feedback; and (5) inside-out perspective. These findings are based on data gathered from various sources arguing that these components increase performance levels. Closed loop interaction, without any reduction in the effort exerted, affects positively the retention level. (Wickens, 1992)

The idea of Virtual Reality was imagined by the public and press during the late 1980s and early 1990s. There were science fiction books that focused on a Virtual Reality world engaging its readers so well that they had anticipated it to become actuality. Though not fully examined yet, it might have been one of the reasons for the excitement in Virtual Reality and its potential to increase the quality of education and deal with symptoms, such as the constant drop in test scores of students. It resulted into numerous educational projects involving computer simulations. Many of them were labelled as a Virtual Reality education, though, only a few would fit in one of the strict definitions of the term. For example, according to Don Allison and Larry F. Hodges (Allison and Hodges, 2000) one criterion that especially sets a real VR educational application from a regular computer simulation is that it must present firstly an interactive environment and secondly "…viewing the results in an immersive fashion using a head-tracked display," as stated by regarding an experimental project conducted about Virtual Reality. So, though the confusion on which applications would truly qualify to be called a Virtual Reality education has not been resolved yet, Virtual Reality in one of its forms has become routinely used by many institutions.

While Virtual Reality has originated from gaming, technological advances are responsible for aiding it in expanding its popularity in other industries. The VR market is projected to grow significantly as well as the number of its users. "Markets and Markets" report that the VR market will increase to over $400 million and its users to over 25 million by the year 2018. In the field of education, VR has made students more interested in STEM (Science, Technology, Engineering, Mathematics) education. Approximately half of the students, who take up the STEM course in college, ultimately drop this major due to it being extremely dependent on theory and not providing adequate hands-on experience for the students. Challenging and dull contents can be made exciting through Virtual Reality (Reis, 2014). According to Andrew Connell, Chief Technology Officer (CTO) of Virtalis, a virtual-reality company, says this, "It really improves student up-take when they see they're going to be using the newest technology." He further explains, "Students are paying for their qualification, they're customers. They ask themselves, 'Am I going to be equipped to learn with the latest technologies, and am I going to be ready for the 21st century workplace?' They're looking for universities to go beyond classroom teaching." (Reis, 2014)

Case studies: ESOL courses for adult learners and for elementary school students

Our preliminary exploratory research hinted, that language schools repeatedly face complaints of students, who were not able or not willing to attend face-to-face courses due to their busy schedules. Some students also called for more time-effective courses which could be delivered at various times including late evening hours and weekends. Even prior assessing the question more rigorously, we seized an opportunity to arrange two projects, both with the main goal to provide a proper response on the market call. The projects allowed us to implement videoconferences and Virtual Reality thoroughly and systematically in ESOL[32] courses for adult learners. The projects are

[32] English for Speakers of Other Languages

being carried out since January 2013 as joint actions of four language schools, one civic association and two technology-oriented companies. Geographically they span over two regions of the Czech Republic with total population of 1,14 million people. First of them, EnglishAnywhere.cz[33] provides videoconference-based courses for adult learners of English language in each circuit of the Zlín region. EnglishLife.cz[34] provides Videoconference and Virtual Reality-based courses for adult learners of English language in the Hradec Králové region.

Projects EnglishAnywhere.cz and EnglishLife.cz.

Wide range of courses, such as general ESOL covering A1 – C1 competence levels according to Common European Framework of Reference (CEFR) for Languages (Council of Europe, 2001), specialized English Language courses for professionals in different fields (office, business, technical sector including chemistry, medical sector, travel, and tourism), and courses for tutors, language school management and other employees regarding implementation of online tutoring from various perspectives have been prepared. So far, more than 300 adult learners benefit from the participation on the project in at least one of our courses. Regarding the technology, our videoconference courses operate on an educational platform called LightClass[35], which has been developed as one of the project activities on top of open-source videoconferencing system MConf[36] which incorporates BigBlueButton[37] conferencing rooms and operate them as a part of international load-balancing cooperative network of videoconferencing servers. Our own LightClass layer implemented in web2py[38] framework provides user and privileges management, course management, course content, logging and attendance records, feedback collection, access to session recordings, self-study materials, self-tests and assessment tests, overview of student progress, and range of other useful functions. The virtual reality courses have been prepared to be based in one of OpenSimulator-based[39] hypergrid-enabled worlds. So far OSGrid[40] and Metropolis Metaversum[41] are supported. For each of the worlds we established our own regions with content relevant to the courses as a base, but the tutors may take their students to various locations according to the character and objective of each session. A bridge has been implemented between OpenSimulator instance and our own information

[33] Project Partner Network Active English by the Means of Videoconference, funded under number CZ.1.07/3.2.03/04.0040 from the Operating program Education for competitiveness.

[34] Project Active English by Videoconference and in Virtual Reality, funded under number CZ.1.07/3.2.10/04.0016 from the Operating program Education for competitiveness.

[35] Refer to http://lc.o-it.info.

[36] Refer to http://www.mconf.org.

[37] Refer to http://www.bigbluebutton.org.

[38] Refer to http://www.web2py.com.

[39] Refer to http://www.opensimulator.org.

[40] Refer to http://www.osgrid.org.

[41] Refer to http://www.hypergrid.org/metropolis/wiki/en.

system. It uses avatar presence logs as a source for student attendance records. Our system provides user and rights management, course and schedule management, feedback, overview of student progress, and several more functions. Feedback is being gathered from the involved students in order to assess the suitability of the forms of education and chosen activities, to reveal weaknesses and to improve quality of the courses as well as the technology behind which is being integrated and partially developed.

Besides the two ongoing projects for adult learners an experimental project implementing videoconference tutoring as an extension of English language subject at six chosen elementary schools in the Hradec Králové region in the Czech Republic[42] took place between November 2011 and December 2012. (Zejda, 2014) The project was supported by European Social Fund[43] in partnership between the business and the governmental educational sectors. Video sessions were experimentally integrated into the educational program of each of the elementary schools for the duration of the project. Goals of the elementary education set e.g. by Vodáková (Vodáková, 2008) such as acquisition of effective learning, motivation for life-long education, support creative mind, effective communication, respect for others, respect for cultural, spiritual, moral values, and more. The project followed a goal to support the students involved in the areas of (1) language confidence, (2) ability to work in teams, (3) ability to combine knowledge from different subjects, (4) ICT literacy, and (5) respecting differences in the multicultural world.

Project NetLektor.cz

Three different courses have been created for the project as well as an information system. Up to four tutors connected to a classroom, each of them was assigned to a team of four to five students. In total, several tens of students participated from each grade. The sessions were conducted by tutors from the Philippines. The big cultural differences between the Philippines and the Czech Republic helped to make the project activities more appealing for the students. The main technology used for the communication and interaction over content during the classes was Skype[44] program. In order to support the organization of the sessions, such as timetable planning, progress records, a custom-tailored information system has been prepared.

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[42] The schools involved in the project were from Hradec Králové region, specifically three schools from Hradec Králové city and the remaining three from Chlumec nad Cidlinou, Nechanice and Jičín.

[43] Project Online English tutoring for Elementary Schools, funded under number CZ.1.07/1.1.05/04.0027 from the Operating program Education for competitiveness.

[44] Refer to http://www.skype.com.

Analysis of the response from students

Students who were involved in the first eight-month-long stage of the tutorial were asked to fill in a questionnaire to provide a feedback for the second stage of the project. The questionnaire was presented to the students by the means of the integrated information system created for the purpose of the project. The students were seated in the school IT lab and instructed by their teachers to access a page on the project website. Each student was provided with unique login credentials to access the form. Only students who were either not present at school or who experienced a technical problem with the connection or the web browser (reportedly few cases) did not fill in the form. So, we may assume that those who did not participate in the questionnaire do not consist of a group with a significantly different relationship to the objective of the research goal, so likely they don't cause any significant bias. In total, we managed to gather the feedback from 433 out of 547 students invited, almost 80 per cent. The questionnaire consisted of the following questions[45]. Most of them were closed- choice questions. If the question asked agreement or disagreement with certain statement, five levels were offered. The questions listed in italics were open-ended; the participants could write just anything. The questions were arranged in six blocks.

Table 1: Questions asked in the questionnaire.

Language skills of respondents
In regards to the English language, what do you personally perceive as most difficult? (reading, writing, talking, understanding)
According to you, how important is ability to communicate in English for practical life? (1 to 5 scale)
What was the most difficult for you to participate on the sessions with online tutors?
How difficult was for you to overcome qualms or lack of interest? (1 to 5 scale)
How difficult was it to understand the tutors? (1 to 5 scale)
How difficult was it to find proper words for answers? (1 to 5 scale)
How difficult was it to make meaningful sentences out of the words? (1 to 5 scale)
How difficult were the activities and tasks during the sessions? (1 to 5 scale)
Please, comment on the difficulty of sessions. (open)
Rating of the sessions
How would you rate the topics of the sessions with the tutors? (1 to 5 scale)
Please, try to remember, which topics did you like most and which topics you did not like. (open)
How interesting were the sessions with the online tutors in comparison to regular sessions? (1 to 5 scale)
We involved tutors from the Philippines. How did you like the choice? (1 to 5 scale)
How would you rate the tutors? (mark for each of the tutors who taught the student on a 1 to 5 point scale)
Personal benefit from the sessions
Did the sessions with tutors help you to learn new words or phrases? (1 to 5 scale)
Did the sessions help you to compose meaningful sentences? (1 to 5 scale)
Did the sessions help you to acquire higher self-confidence for communication with foreigners? (1 to 5 scale)
Did the sessions increase your motivation to study the English language further? (1 to 5 scale)
What did you personally get from the sessions? (open)
Did you have a chance to use anything you have learned or to share it with anyone? (yes - no)
Assessment of the form of education
According to you, what is the biggest difference of the sessions with tutors in comparison with regular sessions? (several statements)
What would you indicate as a main advantage of online tutoring over face-to-face? (several statements)
Overall assessment of the project
How would you rate the project as a whole? (1 to 5 scale)
How did you like, that the sessions were scheduled every 14 days? (choice between alternative

[45] The questions were formulated in the Czech language, but for the purpose of this paper we translated them to English.

frequency options)
Would you recommend to apply something similar also at other elementary schools? (1 to 5 scale)
What is the biggest benefit or achievement of the project? (open)
If there is an English language vocational course employing online English tutors available at your school, would you consider your participation? (1 to 5 scale)

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In general, the data acquired provide proofs for what we observed throughout the whole project, that the activities were interesting, inspiring, and beneficial for the students. The conclusion is obvious even without any further statistical analysis. As an example, we are presenting frequency of answers on a question asking an overall rating of the whole project.

Students' feedback

Also only 3.7 % preferred traditional face-to-face sessions over sessions with online tutors, almost ¾ of students (74.4 %) rated topics positively, only 4.1 % found the topics non suitable or boring. More than ¾ of students (77.8 %) rated the sessions with online tutors higher than ordinary English language sessions, for 18.5 % of them both forms are similar and only 3.7 % preferred ordinary face-to-face sessions with an English language teacher to the sessions with online tutors. Though the responses on all questions were very positive, we have to consider, that the enthusiasm was likely higher because the project introduced something new, unusual, and unique, so it is likely that it would decline in time as the method became more common and widespread. In answer to the question "What would you indicate as a main advantage of online tutoring over face-to-face?" 45 % chose "We may communicate with tutors from a big distance", 24 % chose "The sessions are more interesting because we use computers", 12% chose "We may share presentations, documents and other materials", 11 % chose "The tutors don't have to commute" and 7 % chose "Something else". The potential of videoconferencing technology to bridge big distances seems to be the biggest advantage in the eyes of the students among all the options.

Parents of the students involved in the project were also given a chance to comment on the project and its benefits in a structured form. They were given a set of login credentials and instructions on how to access the form. The project team was ready to provide assistance if necessary. Only one form per student could be filled in, so either one of the parents could fill in the form or they could cooperate. In total, we have received 119 forms filled in by students' parents. For those who did not fill in the questionnaire we don't know the exact reasons. So, interpretation of the results gathered from the parents should be made with even higher caution. For these reasons, we don't analyze the data from the parents in this paper any further.

Acceptance of the method by lower grades

Our further research goal was to analyze the inner structure of the feedback. At first we planned the project to involve only grades six and higher (students 12 and above); however, the partner elementary schools persuaded us to change the scope and include even fourth- and five-graders. Specifically we wished to know, if the method is suitable even for students from lower grades, in particular, for grades four and five, who just started learning the language, and for those students most are still struggling to reach A1 level. Two hypotheses were set:

H_0: Online tutoring as a form of education as performed in the aforementioned project in comparison with higher grades is not suitable for grades four and five.

H_1: Online tutoring as a form of education as performed in the aforementioned project is at least equally suitable for grades four and five as for higher grades.

The questionnaire did not contain any questions which would allow us to sort respondents according to school, gender, or grade. Rather we have chosen a more reliable solution. As mentioned above, each participant received unique login credentials. The credentials allowed us to connect the given response with the personal records in our information system. The system contains a lot of data potentially useful for research purposes. The data involves membership of each student in a team. Each team belongs to a class, each class belongs to a school.

Table 2: Frequencies for the "grade" variable.

Grade	Frequency	Percent	Valid Percent	Cumulative Percent
fourth	44	10.2	10.2	10.2
fifth	26	6.0	6.0	16.2
sixth	67	15.5	15.5	31.6
seventh	106	24.5	24.5	56.1
eighth	91	21.0	21.0	77.1
ninth	99	22.9	22.9	100.0
Total	433	100.0	100.0	

More data was acquired during the project, such as the presence of each student in the sessions, tutors' records about each student's progress, grades in several categories provided by tutors for each student after each session, and tutors' free text comments. The data may be used for further analysis, with respect to the privacy requirements. In connection with the aforementioned research goal we decided to include only the variable "grade", which may hold values in the range fourth to ninth. Frequencies for the "grade" variable are shown in the Table 2.

Among the variables describing the attitude of students towards the sessions we might consider several candidates and analyze them either separately, as a set or create an artificial variable as a combination of them. For the purpose of this paper we just chose two variables and analyzed them separately. The variable "confidence", which holds answers on the question 'Did the sessions help you to acquire higher self-confidence for communication with foreigners?' and "satisfaction", which holds answers on the question 'How would you rate the project as a whole?'. Before any further analysis we performed quick checks using Contingency Tables. However, frequency distribution with original values of the "grade" variable leads to suboptimal values for certain combinations, so we would be limited in the range of statistical methods applicable to solve the problem. So, we decided to merge the fourth and fifth grades with frequencies of 44 and 26. Similarly in the "confidence" and "satisfaction" variables the most negative answer, which was least occupied (for "confidence" only nine answers and for "satisfaction" none), was merged with the second most negative. Please, refer to the short version of the resulting Contingency Table (Table 3).

Table 3: Contingency tables for "grade" and "confidence"; and for "grade" and "satisfaction".

		Confidence (Binned)				Total
		very	yes	slightly	very little, not at all	
Grade (Binned)	fourth, fifth	20	27	18	5	70
	sixth	19	28	17	3	67
	seventh	31	50	22	3	106
	eighth	27	32	24	8	91
	ninth	18	42	26	13	99
Total		115	179	107	32	433
		Satisfaction (Binned)				Total
		very	yes	slightly	very little, not at all	
Grade (Binned)	fourth, fifth	27	21	19	3	70
	sixth	33	25	7	2	67
	seventh	42	48	14	2	106
	eighth	34	41	16	0	91
	ninth	30	48	18	3	99
Total		166	183	74	10	433

The Contingency Tables do not provide any reason to conclude that the method was not suitable for lower grades. To reach a more formal conclusion regarding the hypotheses for the whole population we had to choose a suitable method, construct a statistical model, choose a testing criteria, and test the hypotheses. We considered correspondence analysis which is suitable for data in the Contingency Tables, but it won't provide any affirmative answers regarding the hypotheses. ANOVA is not suitable for this type of data. We might have used the log-linear model (Agresti, 2002; Hebák, 2005; Simonoff, 2003)], but it is more suitable for multidimensional Contingency Tables with nominal variables and reveals primarily symmetrical dependencies. Finally, we decided to examine the relationship of "grade" to both "confidence" and "satisfaction" separately. If both tests would suggest refusing H_0 in favour of H_1 (that the method is suitable even for low grades), H_1 will be accepted. If all tests would be against refusing H_0, it won't be refused. In the case of different conclusions of the tests, we would perform further either factor, or correspondence analysis.

Regarding the test criteria, we considered the chi-square test, often used in combination with The Contingency Table. But we are interested specifically in a possible monotonic dependency between the variables, for which the test is not suitable. Further, the data still contains combinations with too low frequencies for chi-square. We also considered the Pearson's product-moment correlation. It has an advantage of showing a good interpretation of the results, but it calculates only linear dependency and works well mainly for the variables with normal distribution and similar variances. We might also use Spearman's rank-order correlation which performs categorization of the data as a part of the calculation and it analyzes general monotonic dependence between the variables. But, it is not well suited for data with "ties" (Norusis and Inc, 2010), which are common in our data.

We decided to choose among a family of statistics, which compare concordant and disconcordant pairs of values. In general, they express a probability, that orders of values are the same in both variables (or reversed). For the analysis we used PASW software (Norusis and Inc, 2010), which supports Kendall's tau-b, which is able to cope with ties, tau-c specifically suitable for bigger rectangular tables, Somers' d, which distinguishes the direction of the relationship. Finally, we chose Gamma, introduced in 1954 to 1972 by Goodman and Kruskal, because it is specifically suitable for combinations of variables with a high portion of the same values.

Further, according to (Göktaş, 2011), for small tables and relatively small data it gives most reliable results among the aforementioned statistics (Spearman's and Pearson's correlation coefficient, Gamma, tau-b, tau-c, Somers d). Using Gamma we could have even used the original variables before we merged them. Based on the pre-research results and after choosing the proper methods we defined the hypotheses in a more specific way:

$H_{0'}$: There is no monotonic relationship between pairs of variables in the population (Gamma closes to 0).

$H_{1'}$: There is a monotonic relationship between pairs of variables in the population (if so, we will have to examine the significance; if accepted the sign will determine the direction).

At the .95 level of significance, we refuse the hypothesis that there is no monotonic relationship between the variables in favour of hypothesis, that the variables are monotonicly related. In regards to the direction of the relationship, lower grade students are more positive about the increase of confidence by the sessions with online tutors. Eleven per cent of the pairs of the examined variables are in favour of this relationship. The approximate level of significance is close to the threshold for refusing or not refusing the H0, but because of the direction of the relationship it won't influence the conclusion.

At the .95 level of significance, we do not refuse the hypothesis, that there is no monotonous relation between the variables. A monotonic relationship was not confirmed. We did not use the word dependence, because Gamma examines symmetrical relationships, it does not indicate which variable is dependent. Table 4 shows the results for both tests.

Table 4: Monotonic relationship of variables "confidence" and "satisfaction" with "grade".

		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Confidence by Grade	**Gamma**	0.109	0.054	2.020	0.043
		Value	**Asymp. Std. Error**	**Approx. T**	**Approx. Sig.**
Satisfaction by Grade	**Gamma**	0.065	0.059	1.105	0.269
N of Valid Cases		433			

Several limitations of the research should be mentioned. As further analysis, not presented in the paper, has proven, all variables considered as determinants of suitability of the methods for the students are highly positively intercorrelated[46]. So, an artificial variable combining the variables might be considered for further research. Regarding the sources of the data, we simply involved all data gathered from all students who participated in our project who were present at school at the time set for the questionnaire. All students came from the same region of the Czech Republic. Three of our six partner elementary schools were from Hradec Králové city (around 93,500 inhabitants). The remaining three were from from smaller cities and towns of Hradec Králové region - Jičín (16,400 inhabitants), Chlumec and Cidlinou (around 5,400 inhabitants), and Nechanice (around 2,300 inhabitants). Though the involved elementary schools provide a varied selection, schools were involved based on the interest of their management and we could not make any quota selection of the schools for the research. We might involve the school as a new variable in the model and perform three-dimensional analysis of the data to evaluate further correlations. But any conclusions from such research would have limited value, because of the small size of the data for such a task. A second limitation is the size of the sample which amounts to 433 responses. A third limitation is that the questionnaire provides only a subjective view of the students. We did not measure if the students truly improved their skills as they reported. A fourth limitation, though we made an effort to prevent any bias caused by the teachers assisting the students with the questionnaires, was that the teachers still might have influenced the process. A fifth limitation, even though the questions were formulated to be easily understandable, potential confusion might influence the results. All these limitations should be considered with caution for any broader interpretation of the results, such as assumptions about using a bigger population of all elementary school students in the Czech Republic.

Conclusions

Overall, videoconferences have reformed the way we teach. How it began might not be known to many, but its influence is certainly evident. It has made education accessible to those who may not otherwise be able to. As a result, more and more people around the world become educated. It also saves schools and students time and money. Because it is able to eliminate distance, travel costs decrease by a substantial amount. Furthermore, videoconferences in classrooms also add excitement to the traditional classroom setting. It might not be a perfect replacement, but it tends to spark more interest in learners than the traditional way of teaching. It delivers a new interactive experience to its users that would not be possible without new technology. The ways to teach with videoconferencing are countless, and so are its benefits. Videoconferencing is an innovation that has affected the world's education as a whole. Similarly, Virtual Reality is no longer a mere video-gamer's toy. As previously stated, it is very useful in education for a variety of reasons. It provides students with an interactive experience that is virtually dynamic, making them inclined to learn more. Its popularity has spread to other industries and only continues to become more successful. With traditional teaching, online classes, e-learning, m-learning, blended learning, videoconferencing, virtual reality, what could possibly be next?

[46] Tested according to Kendall's tau-b.

Regarding the quantitative research we performed on the data collected from the students involved in our first project, we tested if online tutoring as a form of education as performed in the aforementioned project is at least equally suitable for grades four and five as for higher grades. The analysis of the data acquired through our questionnaire has shown, that lower-grade students are either more positive about the method (variables grade and increase of students confidence were 11 % monotonicly related), or at least similarly positive as higher grades (which was true for the overall rating of the project). Despite the limitations discussed at the end of the quantitative research section, we may say, that an enrichment of the English language at elementary schools by the means of videoconferences or similar technology would likely be warmly accepted and perceived as beneficial by students. We may also say, that most likely, younger grade students would like it at least as much as higher-grade students.

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References

Acacio, V., (2012). Top 10 ways to use video conferencing in the classroom [WWW Document]. Blue Jeans Network. URL http://bluejeans.com/blog/use-video-conferencing-education (accessed 12.1.14).

Agresti, A., (2002). *Categorical data analysis*. John Wiley and Sons.

Allison, D., Hodges, L.F., (2000). Virtual reality for education, in: Proceedings of the ACM Symposium on virtual reality software and technology, VRST '00. ACM, New York, NY, USA, pp. 160–165. doi:10.1145/502390.502420

Council of Europe, (2001). *Common European framework of reference for languages: Learning, teaching, assessment* (CEFR). Cambridge University Press, Cambridge.

Göktaş, A., (2011). A comparison and normality test of some measures of association via simulation for rectangular doubly ordered cross tables. *Science Research Essays*, *6*. doi:10.5897/SRE11.1283

Hebák, P., (2005). Vícerozměrné statistické metody 3. Informatorium.

Horton, J., (2008). Video conferencing education [WWW Document]. HowStuffWorks. URL http://people.howstuffworks.com/classroom-video-conferencing.htm (accessed 12.1.14).

Norusis, M.J., Inc, S., (2010). *PASW statistics 18 advanced statistical procedures*, 1st ed. Prentice Hall Press, Upper Saddle River, NJ, USA.

Reis, M., (2014). Could virtual reality be the next big thing in education? [WWW Document]. URL http://www.forbes.com/sites/ptc/2014/08/27/could-virtual-reality-be-the-next-big-thing-in-education/ (accessed 12.1.14).

Simonoff, J.S., (2003). *Analyzing categorical data*. Springer.

Strickland, J., (2007). How virtual reality works [WWW Document]. HowStuffWorks. URL http://electronics.howstuffworks.com/gadgets/other-gadgets/virtual-reality.htm (accessed 12.1.14).

Videoconferencing in Merriam-Webster Dictionary [WWW Document], n.d. URL http://www.merriam-webster.com/dictionary/videoconferencing (accessed 12.1.14).

Vidyo USA, (2012). Vidyo helps support and empower physicians and educators to rebuild Haiti's medical education system [WWW Document]. URL http://www.vidyo.com/wp-content/uploads/2013/10/Vidyo-HME-CStudy-US.pdf (accessed 12.1.14).

Virtual Reality in Merriam-Webster Dictionary [WWW Document], n.d. URL http://www.merriam-webster.com/dictionary/virtual%20reality (accessed 12.1.14).

Vodáková, J., (2008). Obecné cíle základního vzdělávání [WWW Document]. URL http://old.zkola.cz/zkedu/rodiceaverejnost/vybirameskolu/zakladniskoly/28223.aspx (accessed 1.26.14).

Wickens, C.D., (1992). Virtual reality and education, in: IEEE International Conference on Systems, Man and Cybernetics, 1992. Presented at the IEEE International Conference on Systems, Man and Cybernetics, 1992, pp. 842–847 vol.1. doi:10.1109/ICSMC.1992.271688

Zejda, D., (2014). Response of young elementary school students on native speakers: Analysis of a subjective feedback from videoconferencing sessions with tutors from the Philippines: *International Journal of Information Technology and Computer Science*, *16*(1), 67–73.

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