

# E-learning and the quality of education process in Slovenian primary schools

Andi Jambrošič, Blaž Rodič\*

Faculty of information studies

Sevno 13, 8000 Novo mesto, Slovenia

{andi.jambrosic@gmail.com, blaz.rodic@fis.unm.si}

**Abstract.** *Modern education requires the use of ICT in the learning process as a part of the development of the information society. Primary schools in Slovenia follow the latest trends in e-learning, and have largely introduced web-based e-learning and distance education in the past few years. This contribution presents our research on the effects of web classrooms on the education process in Slovenia's primary schools. We have gathered the data from teachers and pupils using web based questionnaires and analysed it with statistical tools. The results indicate that among other positive effects the use of web classrooms can also bring an improvement in the grades of pupils.*

**Keywords:** e-learning, distance learning, web classrooms, primary schools, Moodle

## 1 Introduction

The primary schools in Slovenia have had their Web presence established a long time ago, and their use of web technologies has recently expanded to web classrooms. These mostly supplement the classic education process, and allow the pupils to view the educational content from home. However web classrooms present further opportunities for enhancement of the education process, and research [1] has shown that e-learning can lead to increased pupils motivation, increased data handling abilities and the ability of pupils to adjust their learning pace.

New methods of ICT use in education has been well received by the pupils, which are considered to be well versed in general use of ICT, as well as by their teachers [2]. Web classrooms have enabled the teachers to expand the methods of collaboration with pupils, to easily publish content, and better connect different courses through easier access to the materials and information from other courses and simplified exchange of ideas and experiences among teachers [3]. According to Makuc [4], today it's compulsory to design digital versions of the teaching materials and support them with instructions and electronic tests, and make them available on the web.

This brings advantages both to pupils, who can study from home, and teachers, as the new communication channels allow further support for teaching and knowledge verification.

Research has shown that the use of electronic materials has brought several positive effects on the education process [1] and the academic achievement of pupils in Slovenia's primary schools [5].

However, there are claims that the teachers are overwhelmed by new technology developments in e-learning and that they spend a lot of time learning new technologies and adapting them to their needs [6]. Therefore it makes sense to verify if the investments into e-learning technology in primary schools are producing satisfactory results, and identify the opportunities for improvement.

The purpose of our research was to establish the influence of web classroom utilization on the academic achievements of pupils at primary schools in Slovenia according to the opinions of teacher and pupils and the relationship between intensity of web classroom use and it's positive effects.

## 2 Methodology

### 2.1 The sample and the research method

Quantitative research has been conducted among the primary schools in the Republic of Slovenia, with the target population including all 785 primary schools and department schools [7]. The research was conducted within the classes in the third trimester (years 6 to 9), and segmented in two parts: the teachers of the third trimester, with the target population of 7,123 individuals, differentiated by the demographical qualities: age, gender, work experience, place of residence and course field, and the pupils of the third trimester, with the target population of 53,485 pupils, differentiated by their gender, age, academic achievements and place of birth (according to the SI-Stat data portal [8]). We have measured the opinions of teachers and pupils on the usage of web classrooms in the education process.

\*corresponding author

The research data was obtained with anonymous web questionnaires using Google Documents and Google Sites: two types of questionnaires were prepared, one for teachers and one for pupils. Both questionnaires contain closed questions, start with demographic questions, and continue with questions regarding the frequency of ICT use and the opinions of teachers and pupils regarding the influence of web classroom use on academic achievements of pupils. A five point Likert scale was used with values ranging from “1 - I completely disagree” to “5 - I completely agree”. The questionnaires are available at <https://sites.google.com/site/raziskavaos/>.

## 2.2 Statistical methods

Univariate, bivariate and multivariate statistics were used to analyse individual variables and compare two variables and several variables, respectively. Average value, standard deviation, asymmetry coefficient, flatness and confidence interval were calculated for numeric variables, and frequency distribution was performed for the category variables.

Bivariate statistics were used to compare variables of ICT usage and the opinion on web classroom use with numeric variables, among which the academic achievement was the most interesting. The calculations performed, depending on the variable type, were the correlation test, t-test, and analysis of variance. Both at the t-test and at the analysis of variance the homogeneity of variance was verified using the Levene test. Multiple regression was calculated at the multivariate statistics.

## 3 Analysis of web classroom use in primary schools

### 3.1 Research goals and hypotheses

Web questionnaires were used to obtain data from the teachers and pupils using web classrooms in primary schools. Data was analysed to determine the influence of web classroom use on the quality of education process, motivation of pupils, and communication between teachers and pupils and, most important, the academic achievement of pupils. We have postulated several hypotheses about the positive effects of web classrooms on the education process.

#### Hypotheses:

- H1: Web classrooms improve the quality of education process.
- H2: Web classrooms improve the pupils' motivation to learn.
- H3: Web classrooms improve the academic achievement of pupils.
- H4: Web classrooms simplify the teachers' tracking of pupils' academic achievements.
- H5: Web classrooms improve the communication between teachers and pupils.

## 3.2 Demographic data

### Teachers

Of the 7,123 teachers in the target population, 474 (6.65%) responded to the questionnaire. Of the interviewed teachers 21.10% are male and 78.90% female, which corresponds with the statistical data on the target population - the teachers of the third trimester (20.65% males according to the SI-Stat data portal [8]). The age of the teachers' ranges from approximately 32 years to 50 years, and their work experience ranges from 6.89 to 27.75 years (Table 1), meaning that different groups of teachers, with a wide spectrum of age and work experience are present in the sample.

Table 1: Average values of age and work experience of the interviewed teachers

Variable	Statistic calculation	Value
Age	Asymmetric mean	41.73
	Standard deviation	8.92
Work experience	Asymmetric mean	17.32
	Standard deviation	10.43

### Pupils

Of the 53,485 pupils in the target population, 1,072 (2%) have responded to the questionnaire. Of the pupils, 48.60% were male and 51.60% were female, which corresponds with the statistical data on the target population [8]. The age of pupils was between 11.57 years and 13.89 years (Table 2), as expected for the IIIrd trimester pupils. The majority of respondents (659 or 61%) were pupils in urban schools (settlements with over 500 inhabitants), and (413 or 39%) were pupils in rural schools (in settlements with under 500 inhabitants).

Table 2: Average age of interviewed pupils

Variable	Statistic calculation	Value
Age	Asymmetric mean	12.73
	Standard deviation	1.16

## 3.3 Analysis of ICT use and web classroom use

### Teachers

The scale of ICT usage frequency we used was “never”, “sometimes”, “several times per month”, “frequently”, “very frequently”. The research has shown that teachers “very frequently” use computers to search for data on the web (82.28%), browse the web (76.37%), prepare documents and presentations (75.95%) and prepare exams for pupils (69.41%).

Less frequently, teachers use the computers to communicate with other employees (72.16% do it

“frequently” or “very frequently”), while the communication with pupils is less frequent (47.25% do it “sometimes”, and 21.10% “never” do it). This is expected, as computer based communication with pupils is seldom needed.

Teachers use web classrooms quite often, as 22.36% use them “several times per month”, while 41.14% use them “frequently” or “very frequently”.

#### *Opinion on web classrooms*

Few of the participating teachers disagreed with the statements about the advantages of web classrooms. The less agreed with statements were that the web

classrooms raise the academic achievements of pupils (rated 1 – “I completely disagree” by 6.54% and rated 2 by 20.04%), and that the web classrooms make work with academically challenged pupils easier (rated 1 by 6.75% and rated 2 by 27%).

Table 3 also shows that the biggest perceived advantages of web classrooms are easier access to teaching materials and allowing additional consolidation of knowledge and study of materials, and the advantages that follow are the communication with pupils, knowledge verification, better teaching of the gifted pupils and better motivation of pupils to learn.

Table 3: Evaluation of teachers' opinions of the advantages of web classrooms

How much do you agree with the following statements on advantages of web classrooms?	Arithmetic mean	Standard deviation	Range of opinion	
			From	To
Easier access to additional materials.	4.16	0.93	3.23	5
Allow additional consolidation of knowledge and study.	4.14	0.89	3.25	5
Additional possibilities for communication between teachers and pupils.	3.96	0.99	2.97	4.95
Additional activities for knowledge verification.	3.90	0.98	2.92	4.88
Better teaching of gifted pupils.	3.88	0.97	2.91	4.85
Increase pupils motivation to learn	3.65	1.00	2.65	4.65
Enables linking of courses	3.64	0.92	2.72	4.56
Enables connection of materials with other courses	3.54	0.93	2.61	4.47
Increase general quality of teaching process	3.48	1.01	2.47	4.49
Easier to follow progress of pupils	3.21	1.08	2.13	4.29
Easier work with academically challenged pupils	3.00	1.07	1.93	4.07
Better academic achievements (grades)	2.96	0.92	2.04	3.88

#### Pupils

Pupils use ICT very often to communicate with friends (56.44%), search for data (46.36%) and browse the web (44.40%), also very few of them never engage in these activities. Slightly less frequently, i.e. several times per month or more often they share personal files (64.55), email files (56.06%) and use Wikis (50.37%).

At least occasionally the pupils use ICT to exchange school related files (78.26%), use web classrooms (77.14%), use forums (74.07%), prepare for exams (86.85%) and write documents (93.10%). 57.93% at least occasionally use ICT to communicate with teachers, however many (42.07%) never use ICT for that purpose.

#### *Opinion on web classrooms*

Table 4 shows that the standard deviation of opinions on advantages of web classrooms of surveyed pupils was higher than that of the teachers. The biggest perceived advantages were additional consolidation of knowledge and study, additional activities for knowledge verification, and easier access to additional materials, similar to the opinions of teachers. The difference in opinions of pupils and teachers were in the better academic achievements (grades), where pupils rated the statement higher, and Additional possibilities for communication between teachers and pupils, where pupils rated the statement lower.

Table 4: Evaluation of pupils' opinions of the advantages of web classrooms

How much do you agree with the following statements on advantages of web classrooms?	Arithmetic mean	Standard deviation	Range of opinion	
			From	To
Allow additional consolidation of knowledge and study.	4.01	1.16	2.85	5
Additional activities for knowledge verification.	3.93	1.16	2.77	5
Easier access to additional materials.	3.88	1.21	2.67	5
Better academic achievements (grades)	3.59	1.26	2.33	4.85
Enables connection of materials with other courses	3.57	1.23	2.34	4.80
Increase pupils motivation to learn	3.47	1.32	2.15	4.79
Additional possibilities for communication between teachers and pupils.	3.45	1.25	2.20	4.70
Increase general quality of teaching process	3.35	1.20	2.15	4.55

We have noticed that the few of the surveyed use web classrooms daily (17.93% of teachers and 7.46% of pupils), however many use them occasionally or more often (93.25% of teachers and 77.14% of pupils).

### 3.4 Testing the hypotheses

Several tests of relevant variables were conducted and compared to either support or reject the hypotheses.

#### Hypothesis H1

The first hypothesis we have postulated is: **Web classrooms improve the quality of education process.**

Table 5 shows that the opinions of surveyed teachers and pupils are very much alike. Most of them agree that the web classrooms improve the general quality of the teaching process. From the confidence limits (Table 5) we can conclude that the target population weakly agree that the web classrooms improve the general quality of the teaching process.

Table 5: Numeric values and the t-test for Hypothesis H1

	Arithmetic mean	Standard deviation	Asymmetry	Flatness	95 % confidence interval	
					Lower value	Upper value
<b>Teachers</b>	3.48	1.01	- 0.23	- 0.33	3.39	3.57
<b>Pupils</b>	3.35	1.20	- 0.28	- 0.80	3.28	3.42

The variable of increase of general quality of the teaching process was compared with the variable of web classroom usage frequency as we wanted to show the difference in opinions relatively to the usage frequency, and that can be checked using the one way analysis of variance.

*Levene's test of variance homogeneity:*

- *Statistical significance (Pr) – teachers = 0.14*
- *Statistical significance (Pr) – pupils = 0.13*

As the results of Levene's test of variance homogeneity for both variables are bigger than 0.05, the hypothesis on variance homogeneity is valid and one way analysis of variance can be performed.

From the results of the one way analysis of variance (Table 6) we can see that the results for both groups are alike, meaning that the surveyed teachers and

pupils share similar opinions. To support the hypothesis however it is very important that those that use web classrooms frequently also opine that the web classrooms improve the general quality of the teaching process and that higher usage frequency corresponds with higher opinion on improvement of the general quality of the teaching process. The statistical significance of both tests is lower than 0.05 thus we can conclude that the above statements are valid for the entire primary school population.

Table 6: One way analysis of variance for Hypothesis H1

	Teachers			Pupils		
	Arithmetic mean	Standard deviation	Statistical significance	Arithmetic mean	Standard deviation	Statistical significance
Never	3.20	1.12	1.7e-15	2.97	1.30	9.72e-14
sometimes	3.16	0.95		3.27	1.15	
several times per month	3.37	0.85		3.49	1.08	
Frequently	3.70	0.85		3.56	1.08	
Very frequently	4.25	0.89		4.10	1.16	

According to the findings above, we can **accept** the hypothesis H1: Web classrooms improve the quality of education process.

#### Hypothesis H2

The second hypothesis is: **Web classrooms improve the pupils' motivation to learn.**

Table 7 shows that the opinions of teachers and pupils are very similar. In average, the surveyed weakly agree with the statement that web classrooms improve the pupils' motivation to learn. From the confidence limits we can conclude that the surveyed weakly agree that the web classrooms improve the pupils' motivation to learn.

Table 7: Numeric values and the t-test for Hypothesis H2

	Arithmetic mean	Standard deviation	Asymmetry	Flatness	95 % confidence interval	
					Lower value	Upper value
Teachers	3.65	1.00	-0.46	-0.20	3.56	3.74
Pupils	3.47	1.32	-0.41	-0.97	3.39	3.55

The variable on increase of pupil motivation was compared with the variable of web classroom usage frequency as we wanted to show the difference in opinions relatively to the usage frequency.

*Levene's test of variance homogeneity:*

- *Statistical significance (Pr) – teachers = 0.47*
- *Statistical significance (Pr) – pupils = 2.03e-12*

As the result of Levene's test of variance homogeneity for the variable in the case of teachers is bigger than 0.05, the hypothesis on variance homogeneity is valid and one way analysis of variance can be performed. However, for pupils the result is less than 0.05, therefore the hypothesis on variance homogeneity is not valid, and a different test was performed for this variable – the Kruskal-Wallis test.

Table 8: One way analysis of variance and the Kruskal-Wallis test for Hypothesis H2

	Teachers (one way variance test)			Pupils (Kruskal-Wallis)	
	Arithmetic mean	Standard deviation	Statistical significance	Rank	Statistical significance
Never	3.29	1.06	8.25e-8	3	2.2e-16
Sometimes	3.51	1.00		3	
Several times per month	3.64	0.85		4	
Frequently	3.71	0.92		4	
Very frequently	4.21	0.95		5	

The results of both tests (see Table 8) have shown similar values, thus we can conclude that both groups (teachers and pupils) share similar opinions. Those that use web classrooms think that they increase the motivation of pupils to learn, and higher usage frequency corresponds with higher opinion on the web classrooms effect on pupil motivation. Those that use web classrooms very frequently completely agree with the statement that web classrooms improve the pupils' motivation to learn. Statistical significance of both tests is under 0.05 thus we can conclude that above statements are valid for the entire primary school population.

According to the findings above, we can **accept** the hypothesis H2: Web classrooms improve the pupils' motivation to learn.

### Hypothesis H3

The third postulated hypothesis was: **Web classrooms improve the academic achievement of pupils.**

Table 9 shows that the opinions of surveyed teachers and pupils do not differ a lot, and that the difference is close to the threshold of agreement (below 3: no agreement, above 3: agreement). In average, teachers are neutral towards the statement in hypothesis. The value is slightly below the threshold of agreement, and the standard deviation is nearly 1, meaning that there are two significant groups present: some teachers agree with the statement, and others don't. From the standard deviation we can conclude that a similar dissonance is also present in the population of pupils.

Table 9: Numeric values and the t-test for Hypothesis H3

Variable	Arithmetic mean	Standard deviation	Asymmetry	Flatness	95 % confidence interval	
					Lower value	Higher value
Teachers	2.96	0.92	- 0.05	0.05	2.88	3.04
Pupils	3.59	1.26	- 0.52	- 0.75	3.51	3.67

The variable on increase of academic achievements of pupils was compared with the variable of web classroom usage frequency, as we wanted to show the difference in opinions relatively to the usage frequency.

*Levene's test of variance homogeneity:*

- *Statistical significance (Pr) – teachers = 0.61*
- *Statistical significance (Pr) – pupils = 0.00038*

As the result of Levene's test of variance homogeneity for the variable in the case of teachers is bigger than 0.05, the hypothesis on variance homogeneity is valid and one way analysis of variance can be performed. However, for pupils the result is less than 0.05, therefore the hypothesis on variance homogeneity is not valid, and the Kruskal-Wallis test was performed for this variable.

Table 10: One way analysis of variance and the Kruskal-Wallis test for Hypothesis H3

	Teachers (one way variance test)			Pupils (Kruskal-Wallis)	
	Arithmetic mean	Standard deviation	Statistical significance	Standard deviation	Statistical significance
Never	2.68	0.88	7.42e-6	3.0	3.11e-7
Sometimes	2.82	0.86		4.0	
Several times per month	2.92	0.90		4.0	
Frequently	3.10	0.90		4.0	
Very frequently	3.39	0.97		4.5	

According to the one way analysis of variance for teachers (Table 10) it's evident that those surveyed teachers that use the web classrooms frequently or very frequently, believe that web classroom usage can improve the academic achievements of pupils, while other teachers disagree, however the values are close to the threshold of agreement. The surveyed pupils agreed with the statement much more though, as all pupils that use the web classrooms at least sometimes either agreed or strongly agreed. As the statistical significance for both groups' results is lower than 0.05, we can generalize that these results represent the entire population.

According to the findings above, we can **accept** the hypothesis H3: Web classrooms improve the academic achievement of pupils.

#### Hypothesis H4

The fourth hypothesis postulated was: **Web classrooms simplify the teachers' tracking of pupils' academic achievements.**

We have analysed the opinions on two different statements to verify the hypothesis: "Web classrooms offer additional activities for knowledge verification." And "Web classrooms make it easier to follow the progress of pupils." The surveyed teachers weakly agree that web classrooms allow them to follow the progress of pupils more easily (see Table 11), but the value of this variable is only slightly higher than the threshold of agreement. The confidence limits allow us to generalize that these results represent the entire population of primary school teachers.

Results for the second variable ("additional activities for knowledge verification") in Table 11 show that the opinions of surveyed teachers and pupils are very similar. All participants agree that web classrooms offer additional activities for knowledge verification. The confidence limits again allow us to generalize that these results represent the entire population of primary school teachers and pupils.

Table 11: Numeric values and the t-test for Hypothesis H4

Variable	Arithmetic mean	Standard deviation	Asymmetry	Flatness	95 % confidence interval	
					Lower value	Higher value
<u>Teachers</u> easier to follow the progress of pupils	3.21	1.08	0.04	- 0.61	3.11	3.31
<u>Teachers</u> additional activities for knowledge verification	3.90	0.98	- 0.52	- 0.44	3.81	3.99
<u>Pupils</u> additional activities for knowledge verification	3.93	1.16	- 0.91	- 0.07	3.86	4.00

The variable on additional activities for knowledge verification was compared with the variable on easier following of the progress of pupils (from the teachers' survey). As both variables are numeric, I have verified with flatness and asymmetry coefficient test if the variables have a normal distribution (see Table 11). As both values are between -1 and +1, the variables have normal distribution and a comparison using the Pearson correlation test was possible.

The correlation value of a variable with itself is always 1 (see Table 12), while the correlation of the

two variables produced the correlation coefficient with value of 0.57. Because this value is higher than 0.30, we can conclude that within the population of teachers these two variables demonstrate a linear correlation. That is, a higher value for the agreement on the availability of additional activities for knowledge verification in web classrooms means also higher agreement on the statement that web classrooms make following of the progress of pupils easier.

Table 12: Pearson correlation test and its statistical significance

Correlation			Statistical significance		
	Additional activities for knowledge verification	Easier following of the progress of pupils		Additional activities for knowledge verification	Easier following of the progress of pupils
Additional activities for knowledge verification	1	0.57	Additional activities for knowledge verification		0
Easier following of the progress of pupils	0.57	1	Easier following of the progress of pupils	0	

The statistical significance of the correlation coefficient is lower than 0.05 therefore we can conclude that for the surveyed teachers, the variables are correlated.

Thus we can accept the hypothesis H4: Web classrooms simplify the teachers' tracking of pupils' academic achievements.

#### Hypothesis H5

The fifth hypothesis postulated was: **Web classrooms improve the communication between teachers and pupils.**

In the average the surveyed teachers and pupils (somewhat less) agree that one of the advantages of web classrooms are the additional possibilities for teacher-pupil communication (see Table 13), which can contribute to the improvement in the communication itself. According to the confidence limits we can conclude that the above statement is also valid for the entire primary school populations of teachers and pupils.

Table 13: Numeric values and the t-test for Hypothesis H3

Variable	Arithmetic mean	Standard deviation	Asymmetry	Flatness	95 % confidence interval	
					Lower value	Higher value
Teachers	3.96	0.99	- 0.72	- 0.10	3.87	4.05
Pupils	3.45	1.25	- 0.35	- 0.91	3.37	3.52

The variable on additional possibilities for teacher-pupil communication was compared with the variable on frequency of usage of ICT for teacher-pupil communication, as we wanted to show the difference of opinions related to usage frequency.

*Levene's test of variance homogeneity:*

- *Statistical significance (Pr) – teachers = 0.0002*
- *Statistical significance (Pr) – pupils = 0.0007*

\*corresponding author



As the Levene's test result is less than 0.05, the variance homogeneity is not present, and the Kruskal-Wallis test was performed for this variable.

Table 14: Kruskal Wallis test for hypothesis H5

	Teachers (Kruskal-Wallis)		Pupils (Kruskal-Wallis)	
	Rank	Standard deviation	Rank	Standard deviation
Never	3.5	3.92e-11	3	2.2e-6
Sometimes	4.0		4	
Several times per month	4.0		4	
Frequently	5.0		4	
Very frequently	5.0		5	

From the results of the Kruskal Wallis test we can see that for all the surveyed the increase in ICT for communications between teachers and pupils usage correlates with increase in agreeing that the web classrooms improve teacher-pupils communication. The statistical significance of both test is under 0.05, thus we can conclude that this is valid for the entire primary school population.

Therefore we can accept the hypothesis H5: Web classrooms improve the communication between teachers and pupils.

## 4 Discussion

Research was aimed at e-learning, specifically the use of web classrooms in the teaching process in primary schools in Slovenia. To our knowledge this was the most comprehensive research on the use and effects of web classrooms in Slovenia's primary schools so far.

E-learning has more than ten years of history in Slovenia's schools, where it has been first adopted by higher education and secondary schools, and somewhat later by the primary schools. Perhaps the best-known current project in this field is the "E-šolstvo" (E-schools) where a public-private partnership is organising courses for teachers to raise their e-learning competences. A web community "Slovensko izobraževalno omrežje" (Slovenian education network [9]) is a part of this project.

The attitudes towards web classrooms and speed of adoption may vary from school to school, but it is foreseeable that web classrooms will be eventually used throughout the primary schools in Slovenia. We should keep in mind that at least currently the web classrooms are not intended to replace "old" classrooms and replace direct teaching with virtual reality methods, but are viewed and used only as a technology to supplement classic methods of teaching.

The benefits of web classrooms include access to teaching materials from home, and gradual increase of interactivity and use of multimedia in these materials, additional channels of communication (e.g. email, forums, chat rooms), additional possibilities for following of the progress of pupils by teachers and self verification of progress, which give students better feedback and more control over their learning process, indirectly increasing their motivation to learn.

Research has shown that web classrooms are mostly not used daily (only 17.93% of teachers and 7.46% of pupils use them daily). As web classrooms are meant to supplement the classic methods of teaching, it is currently acceptable for them to be used at least occasionally (93.25% of teachers and 77.14% of pupils). Teachers and pupils agree on the main advantages of web classrooms, which are better access to materials and additional possibilities for knowledge consolidation and verification. Analysis has shown that most teachers and pupils appreciate web classrooms, and that more frequent web classroom use means a higher opinion of the web classrooms i.e. agreement with the statements on their positive effects in the education process.

All the postulated hypotheses were confirmed in this research; therefore we can claim that the use of web classrooms in primary schools improves the quality of the education process, increases the pupils' motivation to learn, improves their academic achievements, simplifies the following of their progress and improves the teacher-pupil communication. An additional research question that was answered in the second part of our analysis, which will be described in further publications, was focused on the key advantages of web classrooms that influence the academic achievements of pupils.

Web classrooms and ICT are now a common part of the education process in primary schools, and their positive effects are evident, but to fully use their advantages to improve the quality of our primary schools, we should also focus on the development of interesting, interactive and multimedia enhanced teaching materials and their nationwide access. The development of such teaching materials should be the theme of nationwide initiatives in the future, while the focus of our future research will be on the key qualities of interactive and multimedia enhanced teaching materials for the transfer of knowledge and acceptance by both pupils and teachers.

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