EDICIONES COMPLUTENSE

Students' Attitudes Towards the Use of Wikipedia: A Teaching Tool and a Way to Modernize Teaching

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Abstract. This paper presents a research on students' attitudes towards the use of Wikipedia in teaching. The sample was comprised of students from the Pedagogical Faculty in Vranje, a higher education institution affiliated with the University of Niš, Serbia. Students were assigned to write articles on Wikipedia as an alternative to writing their standard term papers; this way the Wikipedia content became significantly enriched, positively evaluating the website as a teaching tool in the process. The results confirmed that students preferred creating articles on Wikipedia to writing standard term papers. Those results may contribute significantly to further improvement and modernization of university teaching.
Key words: Wikipedia in education; Teacher education; Modernization of teaching; Higher education; Teaching tools; Research about Wikipedia

[spa] Actitudes de los estudiantes hacia el uso de Wikipedia: una herramienta de enseñanza y una forma de modernizar la enseñanza

Resumen. Este artículo presenta una investigación sobre las actitudes de los estudiantes hacia el uso de Wikipedia en la enseñanza. La muestra estuvo compuesta por estudiantes de la Facultad Pedagógica de Vranje, una institución de educación superior afiliada a la Universidad de Niš, Serbia. Se asignó a los estudiantes escribir artículos en Wikipedia como una alternativa a la redacción de sus trabajos trimestrales estándar. De esta manera, el contenido de Wikipedia se enriqueció significativamente, valorando positivamente la página web como herramienta de enseñanza en el proceso. Los resultados confirmaron que los estudiantes preferían crear artículos en Wikipedia a escribir trabajos trimestrales estándar. Estos resultados pueden contribuir significativamente a una mayor mejora y modernización de la docencia universitaria.
Palabras Clave: Wikipedia en educación; Formación de profesores; Modernización de la docencia; Educación superior; Herramientas de enseñanza; Investigación sobre Wikipedia

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1. Introduction

Rapid scientific and technological advances have influenced education, initiating a process of modernization in teaching. The Internet and computers are important tools that can be applied in the update of academic instruction at the university/tertiary level; any improvements made in the field require certain changes in education, which in essence refer to the inclusion of modern educational technologies.

The resulting development of such an inclusion has made it possible for teaching materials to become readily available to all the participants in the learning-teaching process. The Internet in particular has a considerable potential for optimizing this proceeding: it generates a large amount of information that is rapidly increasing while remaining globally available at the same time same. Consequently, digital literacy has become an essential aspect of modern and successful teaching.

E-learning has changed the role of the teacher in many aspects, as it has the role of the student. Its importance is, among other things, reflected in the fact that it promotes the development of critical thinking. It provides increasingly more diverse sources of information, which in turn are readily available at our fingertips. Electronic encyclopedias, Wikipedia in particular, have become very significant since they contain millions of articles containing easily accessible information.

Wikipedia represents one of the most successful Wikimedia projects, created with the aim of enabling faster information exchange among Internet users: it is a free source of encyclopaedic knowledge, an Internet project developed by volunteers using wiki software. Wikimedia Serbia started developing the *Wiki Student Project* in 2005. The idea of the project was to introduce students to Wikipedia content and to show its advantages. Also, the project was intended to encourage teachers to take a modern approach to teaching.

2. Related Work

Extensive existing research in the field has shown that there are many aspects of *Wikipedia* that make it suitable for the learning-teaching process, which renders it a fruitful topic for further study. Wikipedia is not only a significant source of information, but it is also a platform for independent student work which could result in the students' own contributions to the Wikimedia community.

The implementation of the *Wiki Student Project* at the Pedagogical Faculty in Vranje, a branch of the University of Niš, Serbia during the 2013/14 academic year has already been described in detail (Stanković et al. 2015).

The cooperation between Wikipedia, on the one hand, and faculties and high schools in Serbia, on the other, has already been described (Stakić 2014). In this particular instance, the authors are referring to a specific assignment, when students were asked to write articles for Wikipedia as an alternative to writing term papers.

The late 20th and early 21st century witnessed the arrival and expansion of Wiki technology in the field of information technologies. It enables each visitor of the site to contribute to its content. The founding of Wikipedia, as the most successful project based on *Wiki* technology, showcased all the possibilities of the *Wiki* software. It has, in turn, become a new standard due to its ever-increasing use. The *MediaWiki* software, one of the most prominent *Wiki* platforms, was written for Wikipedia in 2002 (Stakić 2009).

The gender structure of volunteers who edit Wikipedia is a research topic of some interest: generally, there are significantly fewer women in the field of Information Technology than men, which is reflected in the gender structure of Wikipedia editors. However, the sample presented in this paper comprised more women than men — women comprised 72.9% of the respondents—. More detailed information on the gender gap between Wikipedia editors was provided by Hill & Shaw (2013).

Participating in a cyber community as part of a class-related assignment, exposes students to a completely new culture. New sets of unspoken rules and cultural norms of virtual communities were argued by Brailas et al. (2015).

Earlier research has shown that there is a digital gap between university students and their teachers (Radovanović et al. 2015); the findings indicate that when it comes to adapting to new technology, students are more motivated and more willing than their professors to use the Internet and social media, which is reflected in their skills. Furthermore, a higher level of critical digital skills has a positive impact on learning outcomes (Pagani et al. 2016).

Wikipedia should also be incorporated in class because students become more interested in writing after using a collaborative writing approach with Wiki (Li et al. 2010). Just how much students will rely on Wikipedia is influenced by the attitudes of both the faculties they attend and of their classmates (Garrison 2018).

Even though Wikipedia continues to grow in scope and size, teachers and school librarians still have concerns regarding students' use of Wikipedia in research. Tracy et al. (2015) analysed how classroom teachers and librarians view the effects of student use of Wikipedia on the quality of their research assignments, and on the necessity of school policy regulating the use of Wikipedia. The results strongly suggest that the key to successfully interacting with Wikipedia is education rather than restricted use.

Lim (2009) explored college students' views, motivation, and use of Wikipedia. The goal was to understand college students' behaviour concerning Wikipedia, based on social cognitive theory. The major finding includes the following: approximately one-third of the students reported using Wikipedia for academic purposes. Students tend to use Wikipedia for quick fact-checking and finding background information. This study supports the value of knowledge found on Wikipedia, and it suggests that educators and librarians need to provide better guidelines for using Wikipedia, rather than prevent its use altogether.

Xu and Li (2015) examined the impact of several motivational factors on two different types of user behaviour: content contribution and community participation. The research findings show that content contribution is more often driven by extrin-

sically oriented motivations, including reciprocity and the need for self-development, while community participation is more often driven by intrinsically oriented motivations, including altruism and a sense of belonging to the community.

The usefulness and validity of the information found on Wikipedia was studied in Hong Kong in 2013. Trust played a major role in determining information adoption and fully mediated the relationship between information usefulness and information adoption (Shen et al. 2013).

The results of some studies do not support the overwhelming skepticism of university education regarding Wikipedia. The findings of these studies proved that the overall quality of Wikipedia articles was highly valued and regularly used by both university teachers and students (Aibar et al. 2015).

There is widespread interest in how Web 2.0 tools can be used to improve the learning experience: compared to traditional essay assignments, students' submission of articles to Wikipedia could be regarded as an opportunity to address and resolve many of the issues encountered by instructors of traditional essay writing assignments, such as students' poor writing skills, lack of primary source research, and poorly balanced discussions. It has been discussed that students can improve their standard written assignments using Wikipedia instead of a *Wiki* module (Freire & Li 2016).

Wikipedia could be used in a variety of different ways to help students develop critical and academic writing skills (Konieczny 2016). The role of Wikipedia in higher education was discussed by Soler-Adillon et al. (2018). They presented a teaching and research project where students edited or created Wikipedia articles, and tested whether or not this experience changed their previous opinion of the platform. Students edited articles and answered two questionnaires, one before and one after the exercise. The study showed that students had significantly changed their views of the reliability and usefulness of Wikipedia resources, and the probability of finding false information on Wikipedia. Their appreciation of the task of writing Wikipedia articles, in terms of it being interesting and challenging, also increased. However, they did not significantly change their opinion of the social value of the platform, either in the context of university or in general.

Wikipedia is now an integral part of most students' work, although to a lesser extent than other online sources of information, such as *YouTube* and *Facebook*. It is mostly used as an introductory and supplementary source (Selwyn & Gorard 2016).

The first for-credit course dedicated to Wikipedia was described by Sigalov & Nachmias (2017): in the course, learning was focused on the improved information consumption, and collaborative construction of knowledge using the Wikipedia platform. Peer endorsement may be more important than formal authorities for user-generated information sources, such as Wikipedia (Lim & Simon 2011).

An increasing number of academics recognize that *Wikipedia* can be used as an effective educational resource. Konieczny discussed the advantages of using Wikipedia as a teaching tool (*Wikis and Wikipedia*, 2012). He also described the practice of teaching with Wikipedia, which was based on the author's five-year experience in teaching with *wikis* and Wikipedia, and holding workshops on the subject.

Certain studies sought to empirically determine the pedagogical value of using *Wiki* technology in university courses (Hazari et al. 2009). Some authors showed that use of *Wiki* facilitated students' engagement and collaboration, both inside and outside the classroom. Student learning could significantly be improved as a result of the enhanced learning environment (Salaber 2014).

Wiki has been found to be an effective platform for communication and collaboration in a group project, and for overcoming various barriers. *Wikis* provide ubiquitous access to group work, organization and version control, level the playing field for dominant and shy students, and provide transparency for non-performers and high achievers (Davidson 2012). Wikipedia editing improves information literacy skills (Dawe & Robinson 2017).

Wiki-mediated collaborative writing activities have proven beneficial for adopting a dialogic approach to teaching (Alghasab et al. 2019), and successful as a collaborative writing tool in teacher education (Hadjerrouit 2014).

Finally, there is an interesting study about using Knowledge Management as an alternative strategy devised for assisting school teachers, equipped with relevant skills for facing the challenges of improving performance, and its use in commercial sectors (Chu, et al. 2011). The research showed that knowledge sharing, people, culture and knowledge storage with information technology support were regarded as significant from the respondents' point of view.

3. Methodology

3.1. Participants

The sample consisted of two hundred and three respondents, students of the Pedagogical Faculty in Vranje, a higher education institution affiliated with the University of Niš, Serbia:

Sixty-nine first-year students of the study programme Technical Education and Informatics who attended the course Information Technologies;

Seventy-five first-year students of the study programme Primary School Teaching who attended the course Computer Science; and

Fifty-nine second-year students of the study programme Preschool Teaching who attended the course Computer Science.

The sample was composed of students who volunteered to make articles on Wikipedia as part of their Computer Science and Information Technologies courses. The course Information Technologies was taught in the fall semester, while the course Computer Science was taught in the spring semester.

Before the survey, the students participated in a workshop on editing Wikipedia. Both the workshop and training in editing Wikipedia were held at the Pedagogical Faculty in Vranje by members of Wikimedia Serbia. After the workshop, during their regular classes, the students filled out a questionnaire. Finally, the obtained data were statistically processed.

3.2. Research Design and Instruments

The research was conducted between November 2015 and June 2019. The respondents who participated in the research filled out a questionnaire after they had written their articles and completed the course. The questionnaire was designed to assess their attitudes towards the use of Wikipedia with the aim of modernizing teaching at the university level.

The poll technique was used for data compilation, along with an appropriate instrument —an anonymous questionnaire—. It was designed for research purposes and consisted of five areas which covered five hypotheses. The respondents' attitudes were recorded on a five-point *Likert*-type scale, ranging from strongly disagree to strongly agree. They were used to determine the respondents' opinions on the use of Wikipedia in teaching, as well as their views of the influence of Wikipedia on the modernization of teaching.

3.3. Research Aims

The aim of the research was to examine the connection between the use of Wikipedia in the learning-teaching process and any attempts to modernize and improve the quality of teaching. The research aims were:

1) To determine whether the respondents preferred creating articles on Wikipedia to writing term papers as a form of extracurricular work;
2) To examine the influence of the *Wiki Student Project* on the active participation of the respondents in the teaching process, as well as on the modernization of the teaching process; and
3) To determine whether there was a statistically significant difference between the respondents in terms of certain independent variables —their gender, grade point average, and study programme—.

3.4. Research hypotheses

General hypothesis: The increased use of Wikipedia in teaching improves its quality, and students have a constructive view about using Wikipedia as a learning tool. Specific hypotheses:

1) The respondents prefer creating articles on Wikipedia to writing term papers;
2) The respondents positively assess the influence of the *Wiki Student Project* on the active participation of students in the classroom, as well as on the improvement of the quality and modernization of teaching;
3) There is no statistically significant connection between gender and positive attitude towards the use of Wikipedia in teaching;
4) There is no statistically significant difference in the respondents' attitudes towards the use of Wikipedia in modern teaching based on their choice study programmes; and
5) The respondents' grade point average does not lead to a positive attitude towards the use of Wikipedia in teaching.

The last three hypotheses refer to research quality. The research was designed and conducted with the purpose of obtaining objective, impartial results and conclusions.

3.5. Research variables

The nature of the research required for the variables to be divided into independent and dependent ones. The independent research variables were gender, study programme, and grade point average.

"Gender" refers to differences in attitudes between the male and female respondents. Wikipedia is edited by few women, only around thirteen percent (Antin, Yee,

Cheshire, & Nov, 2011). Therefore, it is relevant that the students of the Pedagogical Faculty in Vranje, Serbia, are predominantly females.

"Study programme" refers to possible variations in the attitudes of respondents from various study programmes towards the use of Wikipedia in teaching.

"Grade point average" indicates that students who have a higher-grade point average are more interested in the modernization of teaching; also, they are more inclined towards volunteerism.

The dependent variables included the attitudes of the students towards the use of Wikipedia in teaching. This research analysed the relationship between the afore-mentioned independent and dependent variables.

4. Results and discussion

The Wiki Student project has successfully been implemented at the Pedagogical Faculty in Vranje, a higher education institution affiliated with the University of Niš, Serbia since 2014. During the 2014/15, 2015/16, 2016/17, 2017/18, and 2018/19 school years, the project was implemented within the courses of Computer Science and Information Technologies. Two hundred and three respondents participated in the implementation of the project and they volunteered to create articles on Wikipedia. Table 1 shows the number of the created articles and bytes within the Computer Science and Information Technologies course during the research period. This resulted in the addition of eighty-two new articles to Serbian Wikipedia.

Table 1. Number of articles created and bytes during the research period.
[Source: compiled by authors].

		2014/15	2015/16	2016/17	2017/18	2018/19
Computer Science	**Articles**	40	19	6	6	5
	Bytes	656722	471400	36876	37281	119580
Information Technologies	**Articles**	/	23	18	4	11
	Bytes	/	530576	121784	31072	35800

This study proved that the electronic encyclopaedia could be an interesting and useful teaching tool which could make lessons more interesting for the students. The respondents were thoroughly engaged in the teaching activities. Moreover, they often used Wikipedia as a source for their term papers —see Table 2—.

Table 2. The distribution of the respondents' answers to the statement "I often use Wikipedia as a source while writing term papers". [Source: compiled by authors].

	I strongly disagree	I don't agree	I neither agree nor disagree	I agree	I strongly agree
Number of respondents in percentages	4.9%	7.4%	22.2%	36.9%	28.6%

After the project implementation, a study was carried out with the purpose of evaluating the respondents' opinions on the use of Wikipedia in teaching, as well as on the influence of Wikipedia on the modernization of teaching. It is a fact that students often use Wikipedia as a source of information for term papers, which was the main motive for conducting this research.

The findings confirmed that the respondents extensively used Wikipedia as an additional source of information needed for the learning-teaching process. Also, they gave a positive assessment of the use of Wikipedia in teaching.

4.1. Hypothesis 1

Respondents prefer creating articles on Wikipedia to writing term papers.

- Option 1.1. Writing a term paper is an interesting way of acquiring new knowledge;
- Option 1.2. Creating articles on Wikipedia is an interesting way of acquiring new knowledge; and
- Option 1.3. Editing Wikipedia entries is more interesting than writing a term paper.

Table 3. Distribution of the respondents based on Options 1.1, 1.2, 1.3.
[Source: compiled by authors].

	I strongly disagree	I disagree	I neither agree nor disagree	I agree	I strongly agree
Option 1.1.	3.9%	8.4%	23.2%	34.5%	30.0%
Option 1.2.	2.0%	6.4%	18.2%	39.9%	33.5%
Option 1.3.	2.5%	6.4%	20.2%	29.1%	41.9%

The results show that creating articles on Wikipedia is more interesting for the respondents than writing a term paper. Therefore, 71.0% of the respondents agreed —and 41.9% respondents strongly agreed— with Option 1.3 —see Table 3—. A term paper is a research paper written by students over one academic term, which accounts for a large part of a grade. Striving for the modernization of education in general has led to the modernization of additional forms of teaching: traditional term papers have not had a big practical application, and experience has shown that authors have not invested a lot of effort into writing them. A special form of cooperation between educational institutions has been developed on Wikipedia in the form of term papers which were converted into Wikipedia articles. During classes, students are introduced to new *Wiki* technology, and then create Wikipedia articles on the proposed topic. In doing so, term papers become available to everyone, so authors are more motivated to work, and the papers have higher quality than traditional term papers. Consequently, Wikipedia content is enriched with reliable and fact-checked information.

The findings related to Hypothesis 1 could encourage teachers to use Wikipedia in order to modernize their activities, as well as to inspire students to actively participate in the classroom.

4.2. Hypothesis 2

Respondents will positively assess the influence of the *Wiki Student Project* on the active participation of students in the classroom, as well as on the improvement of the quality and the modernization of teaching activities.

– Option 2.1. The *Wiki Student Project* ensures a modern approach to teaching;
– Option 2.2. The *Wiki Student Project* has contributed to the improvement of the quality of teaching the Computer Science course; and
– Option 2.3. The *Wiki Student Project* contributes to the active participation of students in teaching activities.

Table 4. Distribution of the respondents based on Options 2.1, 2.2, 2.3.
[Source: compiled by authors].

	I strongly disagree	I disagree	I neither agree nor disagree	I agree	I strongly agree
Option 2.1.	3.0%	5.4%	20.7%	38.4%	32.5%
Option 2.2.	0.5%	5.9%	22.7%	34.0%	36.9%
Option 2.3.	1.5%	5.9%	20.7%	36.5%	35.5%

Previous research has indicated that Wikipedia generally has a positive influence on the active participation of students in the classroom (Moy et al. 2010). Students were especially motivated because their paper was available to the public, and the effort they invested into writing articles was easily noticed by a large number of Wikipedia users. Moreover, students gained detailed knowledge about the assigned topic and learned how to transfer advanced scientific concepts to the public by using modern technology.

This research confirmed these results: since most of the respondents agreed or strongly agreed with the aforementioned attitudes, Hypothesis 2 was confirmed —see Table 4—. The respondents positively assessed the influence of the *Wiki Student Project* on the quality of teaching the Computer Science course.

This result is significant because it might entice teachers to implement the aforementioned projects into their courses, with the purpose of raising students' active participation in the classroom. Additionally, the research shows that the *Wiki Student Project* enables the modernization of teaching activities, which is one of the priorities of educational institutions today.

4.3. Hypothesis 3

The results did not confirm Hypothesis 3. They showed a statistically significant connection between gender and a positive attitude towards the use of Wikipedia in teaching —as shown by Pearson's correlation coefficient—.

The data presented in Table 5 show that there was no statistically significant correlation between the respondents and the set of variables which referred to their atti-

tude towards the use of Wikipedia in elementary and secondary education, or in college education.

There was a weak and statistically significant positive correlation between the respondents' gender and their attitude towards the use of Wikipedia in modern teaching: females displayed a slightly more positive attitude towards the use Wikipedia in modern teaching.

Table 5. Pearson's correlation coefficient calculated for the respondents' gender and their opinion about using Wikipedia in teaching. [Source: compiled by authors].

Correlations		
		Gender
Gender	Pearson Correlation	1
	Sig. (2-tailed)	
Wikipedia can be successfully used in teaching in elementary school	Pearson Correlation	0.070
	Sig. (2-tailed)	0.323
Wikipedia can be successfully used in teaching in secondary school	Pearson Correlation	0.087
	Sig. (2-tailed)	0.218
Wikipedia can be successfully used in teaching in the faculty	Pearson Correlation	0.124
	Sig. (2-tailed)	0.078
Wikipedia can be used in modern teaching	Pearson Correlation	0.070
	Sig. (2-tailed)	0.319

**. Correlation is significant at 0.01 level (2-tailed).

It is important to note that the majority of the respondents were females (61.6%) —see Figure 1—. This differed significantly from the total number of volunteers who contributed to the development of Wikipedia. A massive poll conducted in 2008 showed that women only made up thirteen percent of the total number of Wikipedia editors. According to a study from 2015 (Maljković 2015), there were 157,353 registered users of Wikipedia in the Serbian language and four thousand two hundred and two had enabled the gender selection option. The male option was chosen by three thousand three hundred and nine users, and the female option was chosen by seven hundred and ninety-three users. This meant that women made up 18.9% of this population, which was significantly lower compared to the prevalence of men in the population.

Based on the results of previous research, it was confirmed that women exhibited significantly less self-confidence when editing Wikipedia —see Figure 1—. Also, women felt uncomfortable when they edited other people's articles and had negative reactions to any criticism of their own work. In that sense, the results related to Hypothesis 3 were unexpected. This may initiate a new study which would be conducted only in southern Serbia. Also, the study could be conducted at all Pedagogical, Teacher Education faculties or Teacher Training colleges in Serbia.
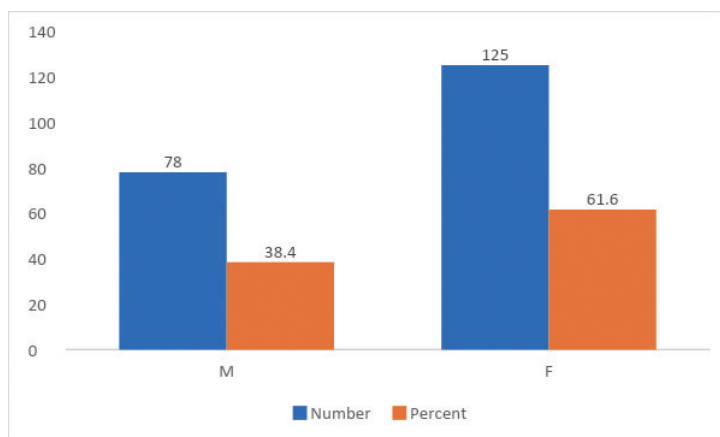
Figure 1. The distribution of respondents based on gender.
[Source: compiled by authors].

4.4. Hypothesis 4

The research confirmed Hypothesis 4. No statistically significant difference was determined between respondents attending different study programmes with regard to their attitudes towards the use of Wikipedia in modern teaching.

The respondents were divided into three groups based on their choice of study programmes —Technical Education and Informatics, Primary School Teaching and Preschool Teaching—. The data pertaining to their attitudes towards using Wikipedia was analysed using the *Kruskal-Wallis* test. This nonparametric test was selected due to a lack of normal distribution of the tested variables —the value of the Kolmogorov-Smirnov test was statistically significant—. As a result, a single factor variance analysis for independent samples which represented its parametric alternative could not be used. The *Kruskal-Wallis* test compares medians when there are more than two groups in the sample, unlike the variance analysis which compares mean values. Hypothesis 4 encompassed the following options:

– Option 4.1. Wikipedia can be used in modern teaching;
– Option 4.2. Editing Wikipedia is more interesting than writing a term paper;
– Option 4.3. Wikipedia is a reliable source of information; and
– Option 4.4. The *Wiki Student Project* ensures a modern approach to teaching.
– Option 4.5. It is interesting to edit Wikipedia.

Table 6. The *Kruskal-Wallis* test calculated for the three groups of respondents. Note: χ^2 –statistic, df – degree of freedom, p – statistical significance. Hypothesis 4 was confirmed for p > 0.05. [Source: compiled by authors].

	Option 4.1.	Option 4.2.	Option 4.3.	Option 4.4.	Option 4.5.
χ^2	1.211	0.011	1.846	2.587	1.311
df	2	2	2	2	2
p	0.546	0.994	0.397	0.274	0.519

4.5. Hypothesis 5

The grade point average will not influence the formation of a positive attitude towards the use of Wikipedia in teaching.

Pearson's correlation coefficient was calculated to determine whether there was a connection between the respondents' grade point average and their attitudes towards the use of Wikipedia in teaching. The data in Table 7 show that no statistically significant correlation was determined.

Table 7. Pearson's correlation coefficients calculated for the respondents'
grade point average and their opinion towards the use of Wikipedia in teaching.
[Source: compiled by authors].

Correlations		
		Grade point average
Grade point average	Pearson Correlation	1
	Sig. (2-tailed)	
Wikipedia can be successfully used in teaching in elementary school	Pearson Correlation	0.081
	Sig. (2-tailed)	0.253
Wikipedia can be successfully used in teaching in secondary school	Pearson Correlation	0.044
	Sig. (2-tailed)	0.532
Wikipedia can be successfully used in teaching in the faculty	Pearson Correlation	0.087
	Sig. (2-tailed)	0.217
Wikipedia can be used in modern teaching	Pearson Correlation	0.124
	Sig. (2-tailed)	0.077

**. Correlation is significant at the 0.01 level (2-tailed).

4.6. The respondent's overall impression of the use of Wikipedia based on gender

For the general impression of the respondents regarding the use and editing of Wikipedia, the situation is somewhat different than in Hypothesis 3. The *Mann-Whitney U* test was used to determine any possible differences in opinion between two independent groups of respondents —the division was made based on gender—.

Grade 1 on the scale means that the respondents had a strong negative impression, and Grade 5 that respondents had a positive impression of the use and editing of Wikipedia. It was noted that respondents of both genders expressed rather similar and generally positive attitudes —by predominantly selecting Grade 4—.

Table 8. The respondents' overall impression of the use and editing
of Wikipedia based on gender. [Source: compiled by authors].

Gender	Number of respondents	General impression of the use of Wikipedia			
		MV	SD	MIN	MAX
Male	78	3.92	0.879	1	5
Female	125	4.02	0.712	1	5

Note: MV-mean value, SD-standard deviation, MIN-minimum, MAX-maximum.

When compared to the results for Hypothesis 3, the responses proved that the female respondents had a more positive attitude towards the implementation of Wikipedia in teaching, while the *Mann-Whitney U* test revealed that there was no statistically significant difference in the respondents' overall impression of using Wikipedia between the male (Md = 3.92, N = 78) and female respondents (Md = 4.02, N = 125), U = 4597, Z = -0.76, p = 0.444 —see Table 8 and Table 9—.

Table 9. The *Mann-Whitney U* test calculated for the differences in general attitude
towards the use and editing of Wikipedia between respondents of the same gender.
[Source: compiled by authors].

Mann-Whitney U	4597.000
Wilcoxon W	7678.000
Z	-0.76
P	0.444

Note: Mann-Whitney U – test value, Z – standardized statistic, p – statistical significance.

4.7. The respondent's overall impression of the use of Wikipedia based on their choice of study programme

The *Kruskal-Wallis* test was used to analyse the data pertaining to the overall impression of the use and editing of Wikipedia expressed by the three groups of respondents —determined based on choice of study programme: Technical Education and Informatics, Primary School Teaching and Preschool Teaching—. The test revealed that there was no statistically significant difference between the groups: χ^2 (2, N = 203) = 0.111, p = 0.946 —see Table 10—. Also, in relation to Hypothesis 4, no statistically significant difference was determined between respondents attending different study programmes in terms of their attitudes towards the use of Wikipedia in modern teaching.

Table 10. The *Kruskal-Wallis* test calculated for the differences between three groups
of respondents regarding their general impression of the use and editing of Wikipedia.
[Source: compiled by authors].

χ^2	0.111
df	2
p	0.946

Note: χ^2 –statistic, df – degree of freedom, p – statistical significance.

4.8. The respondent's overall impression of the use of *Wikipedia* based on their grade point average

The *Kruskal-Wallis* test was used to compare four groups of respondents the division is based on their grade point average —from 6 to 7, from 7 to 8, from 8 to 9 and from 9 to 10— in terms of their overall impression on the use and editing of Wikipedia. The test revealed no statistically relevant differences between the four groups: χ^2 (3, N = 203) = 6.127, p = 0.106 —see Table 11—. It was determined that the grade point average did not influence the respondents' attitude towards the use of Wikipedia in teaching.

Table 11. The *Kruskal-Wallis* test calculated for the differences between four groups of respondents regarding their general impression of the use and editing of Wikipedia. [Source: compiled by authors].

χ^2	6.127
df	3
P	0.106

Note: χ^2 –statistic, df – degree of freedom, p – statistical significance

4.8. Discussion

The research described in this paper can significantly contribute to the upgrade of educational projects: the results show that the respondents generally have a positive attitude towards the use of Wikipedia in teaching, and that the use of Wikipedia contributes to the modernization of teaching activities. Modernizing education has become an indispensable requirement for our society. Bearing all of this in mind, this research can entice teachers to incorporate Wikipedia as additional literature and therefore contribute to this necessary renewal of education, whilst at the same time enriching the content on Wikipedia.

However, some of the results were unexpected and rather unusual: it was expected that the respondents with a higher-grade point average would show greater interest and motivation for the activities prescribed by the curriculum, as well as for extracurricular activities. The research showed that the grade point average did not have an important impact on the respondents' attitudes towards the use of Wikipedia in teaching. This is why it is important to emphasize the fact that the majority of the respondents came from south Serbia, one of the least developed parts of the country. There is a high possibility that the economic underdevelopment and lack of finances partially demotivated the respondents with a higher-grade point average from taking part in extracurricular activities.

Also, in recent times, the teaching profession had experienced a decrease in popularity due to the fact that it is almost impossible to find a job after graduation. This fact may have some effect on the research, in that it "equalizes" the attitudes of respondents with different grade point averages.

It should be noted that the majority of the respondents were female —one hundred and twenty-five women and seventy-eight men—, which is not the case with Wikipedia volunteers. Namely, most of the volunteers are men, so the obtained re-

sults should be viewed from that perspective; this difference justifies the fact that some of the results do not match those of previous studies in which the majority of the respondents were males. Also, the research confirmed that the implementation of the Wiki Student Project at the Pedagogical Faculty in Vranje had a positive impact on the increase in the female population among Wikipedia volunteers.

5. Conclusion

The research confirmed the general hypothesis. Therefore, the results show that the respondents gave a positive assessment of the use of Wikipedia in teaching. They agreed with the assumption that Wikipedia improves the quality of teaching; this refers to the introduction of new technologies, including the use of the internet sources of information, such as the aforementioned online encyclopaedia. The use of Wikipedia in the classroom encourages students to collaborate and participate in the development of new articles. One of the outcomes of its implementation in teaching is the development of the ability to find quality sources of information.

The assumption that the respondents preferred creating articles on *Wikipedia* to writing term papers was confirmed, too. Moreover, the assumption that they gave a positive assessment of the influence of the *Wiki Student Project* on active participation of students in the classroom was confirmed. It was also confirmed that the respondents gave a positive evaluation of the use of *Wikipedia* in teaching. They recognized the benefit of the aforementioned innovations.

It was concluded that there was a statistically significant connection between gender and a positive attitude towards the use of Wikipedia in teaching: females demonstrated a slightly more positive attitude towards the use of Wikipedia in modern teaching than their male counterparts. The grade point average and choice of study programme did not have an impact on the formation of a positive attitude towards the use of Wikipedia in teaching.

When it comes to the respondents' overall impression of the use of Wikipedia in teaching, the results were slightly different. No statistically significant difference was determined in the overall impression of using Wikipedia between male and female respondents. Likewise, the respondents' choice of study programmes and their grade point average did not influence their overall impression of using Wikipedia.

The research results show the advantages of using modern teaching tools. The conclusion is that modern teaching tools and methods improve the quality of the learning-teaching process. Therefore, it is expected that these findings will motivate teachers and students to use modern teaching tools as part of their educational experience. The implementation of modern teaching tools and methods represents an imperative for future education. Based on the results obtained in this research, it was confirmed that Wikipedia is a very useful modern teaching tool which contributes both to the modernization of teaching, and to the improvement of the quality of teaching.

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