The Attitudes of K–12 Schools’ Teachers in Serbia towards the Potential of Artificial Intelligence

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Abstract: Similar to so many other aspects of modern life, education is gradually being automated by technological means. The software, apps, systems, platforms, and digital devices that permeate modern education are inextricably linked to these automated processes. One of the primary goals of automation has always been to improve quality and efficiency by reducing the number of human repetitive tasks based on machine learning (ML) algorithms and applications that facilitate the automation of decision-making of artificial intelligence (AI). Thus, computers and robots are predictable and do exactly what they are programmed to do. It is impossible for a computer’s memory or processing power to become “tired” because machines never rest, and now some activities can be automated, thanks to advances in artificial intelligence. Schools nowadays have software that analyses data and makes decisions based on the data rather than relying solely on human analysts regarding repetitive administrative tasks. The exploratory research within the K–12 group of teachers from LINK Educational Alliance from Serbia was performed on 109 persons to identify the genuine knowledge about AI and the potential for automatisation of work processes. Based on the teachers’ opinions regarding opportunities brought about by AI in K–12 schools, we analysed their implications in implementing AI in the educational process in K–12 education.

Keywords: K–12 schools; teachers; artificial intelligence; education; software automatisation

1. Introduction

Teaching and teachers are essential for the sociality and policymakers [1]. The Sustainable Development Goal 4 for Global Education Agenda aims to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” by 2030 [2]. The different possibilities concerning access to technological equipment and scientific knowledge reflect different possibilities for success in sports, too [3].

According to the Sustainable Development Goals, gender equity in access to outstanding technical learning and training methods is expected by 2030 [4]. Through education, humankind achieves its sustainable aims of improving their lives [5,6]. Furthermore, egalitarian and inclusive education empowers individuals to design novel solutions to problems in their daily lives. Incorporating digital inclusion and high-quality educational practice enables learners to provide motivation, knowledge, and opportunity; provide skill training to use SDG concepts, and address SDG issues [7,8].

Innovation in education is based on a comprehensive path opened by digital technologies. As a result, education systems and institutions are open to change. Unfortunately,
however, there seem to be potent barriers that prevent digital technologies from reaching their potential in educational institutions and teaching and learning practices [9]. This research collects LEA K–12 teachers’ opinions regarding the opportunities introduced into the educational and administrative process by ML and AI. We also analysed if the level of awareness and knowledge of K–12 teachers influences their willingness to directly implement AI and ML into the educational process. This research has a statistical population of 152 LEA teachers. Our sample (109) is representative of LEA institutions and their LEA population.

The research that we have completed and explained in this article was a pilot study. We conducted a survey among LINK educational Alliance (LEA) K-12 schools in Serbia (four institutions) with a total population of 152 teachers. We have collected 109 answers. After the completion of this study, we used the same survey for the national research, and we addressed all primary and secondary schools via their official addresses. In the Republic of Serbia in 2020/21, 84,772 teachers were employed in primary and secondary education institutions, so the size of the population is 84,772, and due to the fact that the sample consists of 800 respondents, it is adequate. Regarding the representativeness of the sample, the entire sample consisted of teachers in primary and secondary education in the Republic of Serbia employed in educational institutions in the Republic of Serbia who were engaged during the 2020/21 school year so that the sample properly represents the entire population. Therefore, it can be concluded that the sample is representative; that is, it realistically reflects the real structure of the population. It can also be stated that the sample is adequate because it is large enough.

2. Theoretical Background

AI is nowadays used in many areas and has become a partner in solving evolvemental problems. For example, the Artificial Intelligence (AI) partnership founded by Facebook, Amazon, Google, IBM, and Microsoft intends to solve “humanity’s most difficult issues, including breakthroughs in health and wellness, transportation, education, and research” [10]. This example leverages AI technology to provide answers to social issues, which, together with environmental and economic concerns, are essential pillars of sustainability [11]. However, only a few scholars have investigated teachers’ perceptions of AI utilisation due to an overall lack of experience of teachers regarding how AI can be utilised in the classroom and no specific idea of how AI-adopted tools would operate [12].

The COVID-19 pandemic has accelerated the automatisation process in education and showed how some school systems are vulnerable. Adult mentorship and leadership can be challenging to automate, even if technology can automate the ability to teach any technical skill (such as maths, science, coding, etc.). To be effective, mentorship and leadership have to be tailored to each individual. Setting goals is more complicated than learning a new skill. Adults who can mentor and lead students will be in high demand. Discipline helps us acquire a new standard of living, use digital technologies, and automate different tasks that, in the beginning, require effort and time but, in the long term, bring profit and equilibrium [13,14].

To automate socialising, you must first create robots that act similar humans to the greatest extent possible. It is said that this action is safe from automation a hundred years from now. We will still need to educate ourselves about this in the long run. To be part of a team or work with others, you must have a group of people. This cannot be automated. We may not require as much teamwork in the future, and jobs may become more customised. High demand for professionals collaborating with others will always exist, but specific skills can only be learned through practice [15,16].

Automation is already present in many activities of our lives and will have an extensive expansion in coming years. Still, it will be impossible to fully automate the process of creating automated programmes and educational technology. We still need a human programmer to develop computerised systems and new educational tools—a person who can bring together a variety of ideas and technologies. This is the way jobs in education
will be in the future. Computer programmes are better at chess than most people, but they are not good enough to take on a master chess player who uses a computer of their own. Education will be no different [17,18].

It is also worth examining what automation means in the context of educational institutions. Schools are generally eager to embrace traditional IT solutions, which are simply plugged in and then used in the background to leverage data-driven gains and efficiencies. We have emphasised greater transparency and accountability in using these technologies in education, and their results are quite easy to evaluate. However, AI-based automation is quite complex and, therefore, harder to implement and evaluate. Despite industry hype, some claim these technologies weaken educational potency and transformative potential [19–21].

Although AI techniques have demonstrated and projected intelligent computation in the domain of education, they often fail to offer “added value” to a greater audience of students due to price concerns, and the mainstream is still preoccupied with the “basic value”. In addition, several researchers noted that many AI strategies were built for a generic situation that could not satisfy the needs of a particular domain, unique learning activities or specific instructional goals. As a result, tailored learning experiences would not be possible [22,23].

Educators’ positions must also be rethought, according to the Horizon report from 2018. Teachers’ attitudes regarding AI have a considerable impact on implementing AI in education. Teachers can swing from absolute opposition to an overreliance on their students. Professional development that is outdated, inappropriate, or irrelevant can cause the former problem. Teachers must understand that the learning process is more critical and has priority over the integration of AI into the educational process. AI should be considered an instrument, not a scope. From students’ standpoint, clever and efficient tools provided by AI techniques may encourage pupils to avoid undertaking the knowledge processing labour that teachers require. Some examples include ready-made images and pronunciations and a series of examples provided by AI translators [24–26].

The long-term benefits of using automated system techniques are becoming increasingly evident. Incorporating artificial intelligence and expert systems into teaching aids in predicting real-world problems [27].

Essential components of a sustainable e-learning environment are e-learning, technology, applications, e-teaching concepts, and sustainable development. The framework, methodologies and models comprise the pillars of intelligent e-learning and e-teaching, whereas the programmes, syllabi and pedagogical approaches form the concepts of intelligent e-teaching. Suitable guidance and appraisal methods, collaborative learning approaches, and custom-tailored schooling approaches are the base of a tailored coaching plan [28].

Personalisation focuses on self-development and academics. Learners’ self-development is based on the skills and information achieved in online environments and communities. A tailored learning environment includes schooling instruments, services, an application that supports learner skills, an inexpensive schooling environment, and a personalised student profile [29,30]. It will offer an individualised schooling experience to students to efficiently satisfy this learner-centric criterion. It also provides the students with exclusive learning documents designed and collected based on the student’s grasping capacity and their preferred learning medium [27,31].

The LINK Educational Alliance (LEA) is an international educational alliance [32] comprising privately held formal and informal education providers, academic technology services, and business assistance. The exploratory research was conducted among 152 K–12 teachers in Serbia to understand more about teachers’ opinions of AI-based solutions, the potential and problems that AI will bring into their everyday activities and their actual knowledge of AI. SmartPLs 3.0 was chosen to design inferential and variable associations with analyses.
3. Materials and Methods

The study is based on a survey anonymously administered to K–12 LINK Educational Alliance (LEA) in order to evaluate the level of knowledge detained by the LEA teachers regarding AI, assess their opinions regarding the benefits of introducing AI into their teaching, and their overall opinion regarding the implementation of AI in the educational process and its effect on their current and potential work performance.

The study was centred on factors influencing AI implementation within the teaching process. Therefore, the main objectives of this study are (i) to identify the characteristics associated with AI, (ii) to evaluate teachers' knowledge regarding AI and its use in daily life, and (iii) AI utility in education. Thus, our research questions are:

RQ1: How do LEA K–12 teachers perceive artificial intelligence as a tool to support teaching, and what are their expectations?

RQ2: How much do LEA K–12 teachers know about artificial intelligence, use it daily and decide to participate in its implementation actively?

In the segment of research concerning the respondents’ knowledge of artificial intelligence, one of the basic definitions of artificial intelligence (Oxford) was used: “Artificial intelligence is the theory and development of computer systems capable of performing tasks that normally require human intelligence, such as visual perception, speech recognition, decision making and translating from one language to another” [33].

Regarding the examination of the respondents’ knowledge of artificial intelligence, questions were developed based on the research of Kuleto [34]. The questionnaire developed for AI K–12_LEA_TeacherActivity covered all these seven segments with the following variables in the current state and the desired state at the working week level:

- Performance of work tasks related to direct work with students (regular classes, additional and supplementary classes, clubs) covers the segment: Student instruction and engagement.
- Teaching preparation covers the element: Preparation.
- Execution of work tasks related to teaching but not involving direct work with students (reviewing homework, control and other written assignments, monitoring student achievement and providing feedback) covers the segment: Evaluation and feedback.
- Administrative work (filling in a paper/electronic diary, writing a report covers the segment: Administration.
- Professional development covers the segment: Professional development.
- Mentoring, counselling, and direct work with students cover the element: Student coaching and advisement.
- The development of behavioural, social, and social skills of students cover the components: Student behavioural, social, and emotional skill development.

We designed our survey based on the McKinsey Global Teacher and Student Survey [35]. First, the plan was to calculate the average time that teachers dedicate to the presented activities within the total amount of time which they spend on their work: Preparation, Student instruction and engagement, Student coaching and advisement, Student behaviour, social and emotional skill development, evaluation and feedback, Professional development, and Administration. In addition, we asked teachers how much time they spend on 37 core activities, from lesson planning, through teaching, to grading and maintaining student records; a team of psychologists, pedagogists, teachers, and IT specialists validated the survey.

In addition, an online questionnaire specially designed for this research was sent to the addresses of 152 teachers employed in five LINK Educational Alliance levels of primary and secondary education (K–12). According to the defined goal of the research, the population is also observable. As it is essential to define the population in every research that includes respondents, it is necessary to determine the population of its characteristics and size.

The survey was based on the described, specially-developed model. Then, the coherence and consistency of the elements analysed were evaluated through statistical tests, such
as the Cronbach alpha index. Finally, we examined if the items that form different variables contribute to the significance of the hypothesis and if they correlate with the additive result, the overall score [36]. Usually, values greater than 0.6 for the Cronbach alpha ensure a consistent model.

We used a confirmatory analysis in PLS-SEM (CTA-PLS; [37]) that consented to discover the formative and reflective variables.

In our analysis, we have three variables (Table 1 and Figure 1)

1. Two formative variables Opp (with seven subfactors: Oadmin, Odevelop, Odifficult, Oemotion, Oplan, Orequire, Oreview) and Alopinion (with four subfactors: Aautonom, Adevelop, Aperform, Ateacher)

### Table 1. Analysed Variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Subitems</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opinion</td>
<td>Alautom</td>
<td>All subjects, i.e., the processes and activities they involve, can be automated to a certain extent regardless of their educational field.</td>
</tr>
<tr>
<td></td>
<td>Aldevelop</td>
<td>Automated monitoring of student development can indicate the degree of development and detect deviations in it.</td>
</tr>
<tr>
<td></td>
<td>Alperform</td>
<td>AI can increase student performance progress.</td>
</tr>
<tr>
<td></td>
<td>Ateacher</td>
<td>Automated activities will further motivate teachers.</td>
</tr>
<tr>
<td>Opportunity</td>
<td>Oadmin</td>
<td>administrative work (creating reports on work assignments)</td>
</tr>
<tr>
<td></td>
<td>Odevelop</td>
<td>detection of needs for professional development of teachers</td>
</tr>
<tr>
<td></td>
<td>Odifficult</td>
<td>detection of difficulties in learning materials with students</td>
</tr>
<tr>
<td></td>
<td>Oemotion</td>
<td>detection of socio-emotional factors influencing students’ acquisition of knowledge</td>
</tr>
<tr>
<td></td>
<td>Oplan</td>
<td>creation of individual learning plans for students</td>
</tr>
<tr>
<td></td>
<td>Orequire</td>
<td>selection of teaching materials concerning subject requirements</td>
</tr>
<tr>
<td></td>
<td>Oreview</td>
<td>objective review and assessment of homework, tests, written and other assignments,</td>
</tr>
<tr>
<td>Implement</td>
<td>Iassign</td>
<td>by writing assignments for developers</td>
</tr>
<tr>
<td></td>
<td>Ibeta</td>
<td>giving suggestions, beta testing solutions, professional development in the field of AI</td>
</tr>
<tr>
<td></td>
<td>Iproposal</td>
<td>by making a proposal</td>
</tr>
<tr>
<td></td>
<td>Imentoring</td>
<td>mentoring and teaching (helping colleagues) in the implementation of the solution</td>
</tr>
<tr>
<td></td>
<td>Idevelop</td>
<td>writing assignments for developers,</td>
</tr>
<tr>
<td></td>
<td>Iplan</td>
<td>planning to contribute to the AI project implementation and development in school</td>
</tr>
</tbody>
</table>

![Figure 1. Path Coefficient Analysis Composite reliability. (Source: SmartPLS software, version 3.3.9, Created on 2 April 2022) (SmartPLS).](image)

Based on these variables, our research hypothesis is:

**H1. Opportunities brought by AI in K–12 schools positively influence LEA K–12 teachers’ opinions regarding AI utility in K–12 schools.**
H2. LEA K–12 teachers’ opinion regarding AI utility in K–12 schools positively influences their decision to implement AI in the educational process in K–12 schools.

4. Results

A representative sample of 109 people with a 95% confidence level, a 95% confidence interval, and a sample size of adequate was used in 2021/22 when the LINK Educational Alliance employed 152 teachers in primary and secondary education institutions. In addition, teachers in LINK Educational Alliance primary and secondary education institutions engaged during the 2020/21 school year were included in the sample, ensuring that the sample accurately represents its population. Using a confidence interval of 0.95, the error rate is 0.05. The 95 per cent confidence interval was chosen because it was considered reliable and accurate simultaneously. Therefore, our confidence level rises to 95%, meaning there is only a 5% chance we have reached a wrong conclusion for 109 records.

The fact that 54% per cent of those who took the survey had less than five years of work experience and 30% had five to ten years or more suggests that LEA’s staff is relatively inexperienced. There are many reasons for this, including the fact that LEA schools are modern and technologically savvy and that their knowledge is more receptive to teachers of a younger age group. Among LEA teachers, 55% were female, and 45% were male.

The variable presents a good correlation that empowers us to continue the analysis. For example, in Table 2, we may observe a powerful and positive correlation between Opinion and Implement, meaning that teachers convinced of AI’s utility in K–12 schools are ready to take action in implementing AI.

Table 2. Latent correlation between variables and Fornell–Larcker Criterion.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Opinion</th>
<th>Implement</th>
<th>Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opinion</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implement</td>
<td>0.854</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Opportunity</td>
<td>0.507</td>
<td>0.638</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Teachers consider that the utility of AI in K–12 schools encompasses, to a certain extent, the automation of teaching processes and activities (Alautom), the automation of student development monitoring (Aldevelop), the improvement of student performance (Alperform) and the increase in teacher motivation (Alteacher).

Regarding the implementation, teachers are ready to take action by writing assignments (Iassign), giving suggestions, beta testing the solutions, professional development in the field of AI (Ibeta), proposing (Iproposal), helping colleagues in the implementation of the solution (Imentoring), and by writing assignments for developers (Idevelop). Thus, they plan to contribute to the implementation and development of AI in their school (Iplan).

In Table 2, we may observe that there is a medium and positive correlation between Opportunity and Implement, meaning that teachers who discovered the opportunities brought by AI in K–12 schools are ready to take action in the implementation of AI.

Regarding the opportunities, they discovered that AI could be used in fulfilling administrative tasks (Oadmin), the detection of needs for professional development of teachers (Odevelop), the detection of difficulties in learning materials with students (Odifficult), the detection of socio-emotional factors influencing students’ acquisition of knowledge (Oemotion), the creation of individual learning plan for students (Oplan), the selection of teaching materials concerning subject requirements (Orequire), and the objective review and assessment of homework, tests, written, and other assignments (Oreview).

Another medium and positive correlation might be observed between Opportunity and Opinion, meaning that teachers who discovered the opportunities brought by AI in K–12 schools are convinced of its utility, especially for administrative tasks (Table 2).

The Path Coefficients (Figure 1, Table 3) show a strong influence of the teacher’s opinion regarding AI utility over their decision to implement it (Opinion → Implement
0.854). We may observe that their opinion is influenced by the opportunities brought by AI (Opportunity → Opinion 0.507). We also may observe an indirect effect of the opportunities brought by AI (that seems very important) on the teacher’s decision to implement it (0.433).

Table 3. Total effects.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Effects</th>
<th>Path Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunity -&gt; Opinion</td>
<td>Direct</td>
<td>0.507</td>
</tr>
<tr>
<td>Opinion -&gt; Implement</td>
<td>Direct</td>
<td>0.854</td>
</tr>
<tr>
<td>Opportunity -&gt; Implement</td>
<td>Indirect</td>
<td>0.433</td>
</tr>
</tbody>
</table>

The results above are also supported by the discriminant validity, evaluated by Fornell–Larcker Criterion [38]. Moreover, the discriminant validity (Fornell–Larcker) is presented between scales, taken two by two, making the model statistically robust, meaning that the variables are significantly different, taken two by two. The FSquare values calculated are higher than the threshold values, ensuring the fit/consistency of our model (Table 4).

Table 4. Fornell-Larcker Criterion.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Implement F Square</th>
<th>Opinion F Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implement</td>
<td>0.280</td>
<td>0.654</td>
</tr>
<tr>
<td>Opinion</td>
<td>0.654</td>
<td>2.684</td>
</tr>
<tr>
<td>Opportunity</td>
<td>0.636</td>
<td>0.507</td>
</tr>
</tbody>
</table>

The Standardised Root Mean Square Residual (SRMR-0.077) has a value less than 0.1 explaining a good fit [39]. The chi-Square value for the estimated model is greater than the value for the saturated model, meaning that our model is consistent and confirms that our hypotheses are accepted (Table 5).

Table 5. Model fit.

<table>
<thead>
<tr>
<th>Latent Construct</th>
<th>Saturated Model SRMR</th>
<th>Estimated Model SRMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRMR</td>
<td>0.078</td>
<td>0.078</td>
</tr>
<tr>
<td>Chi-Square</td>
<td>89.250</td>
<td>90.808</td>
</tr>
</tbody>
</table>

The multicollinearity is analysed through each construct’s Variance Inflation Factor (VIF). VIF values are less than 5 (accepted threshold) for all our constructs. Thus, no collinearity is manifested within our model [40–43] (Table 6).

Table 6. VIF Values.

<table>
<thead>
<tr>
<th>Variable</th>
<th>VIF</th>
<th>Variable</th>
<th>VIF</th>
<th>Variable</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alautom</td>
<td>1.861</td>
<td>Iassign</td>
<td>1.133</td>
<td>Oadmin</td>
<td>1.136</td>
</tr>
<tr>
<td>Aldevelop</td>
<td>1.925</td>
<td>Ibeta</td>
<td>1.152</td>
<td>Odevelop</td>
<td>1.213</td>
</tr>
<tr>
<td>Alperform</td>
<td>1.819</td>
<td>Iproposal</td>
<td>1.052</td>
<td>Odifficult</td>
<td>1.195</td>
</tr>
<tr>
<td>Alteacher</td>
<td>2.022</td>
<td>Imentoring</td>
<td>1.052</td>
<td>Omotion</td>
<td>1.365</td>
</tr>
<tr>
<td></td>
<td>1.304</td>
<td>Idevelop</td>
<td>1.152</td>
<td>Oplan</td>
<td>1.636</td>
</tr>
<tr>
<td></td>
<td>2.011</td>
<td>Iplan</td>
<td>1.220</td>
<td>Orequire</td>
<td>1.298</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Oreview</td>
<td>1.085</td>
</tr>
</tbody>
</table>

5. Discussion

The study set out to evaluate the level of knowledge of LEA teachers regarding AI and assess their attitude towards the utility of AI in teaching and their opinion about the
implementation of AI in the educational process and its effect on their current and potential work performance.

We have found similarities in the results obtained from the other studies we have analysed [44–46]. McKinsey’s study showed, similar to ours, that teachers save the most time when they use technology to do their pre-class preparations, which are the most time-consuming tasks [35]. It is possible to cut the current hours that instructors devote to the preparation of teaching materials and activities by using technology. Teaching time might be saved by automating the design of the curriculum and other associated operations. Using a speech-recognition facility, the teacher can dictate the course and save time in the design of the curriculum [47,48]. Even while current technology is mostly used to save time, it may also improve the preparations as such through an improved curriculum and more effective methods. As a result, instructors may use a wide range of tools to better understand their students’ level of comprehension in certain areas and then design their own lesson plans accordingly [48]. The ability to break students into smaller groups and tailor lessons to the specific needs of each one is also a benefit, as is the ability to access high-quality teaching resources developed by their peers across the world. When it comes to evaluating, the technology offers a lot of promise as well. It has been there for a long time, but today’s software can evaluate lengthier replies and point out to the teacher certain irregularities in students’ knowledge and progress [49]. In locations where teachers and students are in close contact, technology has the least potential to save time. Learning and teaching might benefit from the use of technology, which can speed up the transfer of knowledge and help students retain it better [49]. In reality, this means that instructors are encouraged to utilise educational software in the classroom and to use these tools to improve their own teaching. It is also important to familiarise the students with AI-based teaching tools as a transversal skill [50]. Thus, teachers’ roles will shift to some degree: they will become facilitators and coaches in the future [35].

The existing composition of teachers’ work activities is improved by automating specific educational processes and activities in the part and scope where it proves possible and justified. For example, teachers can automate time-consuming activities such as homework evaluation, the assessment of written assignments, and administrative tasks. Thus, they have more time to spend on professional development, lectures, coaching, collaboration with students, and student career development. Furthermore, due to scientific research, the promotion of results and technology transfer, the AI challenge will be transformed into opportunities over time [50,51].

The teaching process depends on K–12 teachers’ judgments of activities in the educational process that AI may automate and their level of knowledge and comprehension of AI. For example, AI may automate specific procedures and duties when the primary assumption is validated, allowing teachers to work more effectively and spend more time directly interacting with students.

The results showed that respondents had struggled to accept some variables. Based on insights into library sources and case studies of software automation or artificial intelligence in education, it can be stated that a specific type of social and emotional support to students can be software-generated in the form of motivational messages and rewards for achievements. There are many examples of robots that help children with special needs. Regarding the literature review, we can conclude our everyday routines have been made easier thanks to the advancement of cutting-edge technology. As the number of contacts between humans and robots grows, speech will be the most convenient means of communication [49]. Body language is also relevant, concerning emotions that can be conveyed through facial expressions, image classification, and successful emotional state detection (e.g., happiness, anger, sadness, and neutrality). Many fields, such as forensic science [45], customer service call review and analysis, mental health surveillance, intelligent systems, and educational quality evaluations, pay greater attention to speech-based emotion identification tasks. Deep learning has made it easier to detect emotions in speech, but there are still issues with the study on SER, such as a lack of training data.
and an insufficient model [46,47]. Speech real-time emotion depends on speakers, cultures, genders, ages, and dialects [48].

Humanoid robots, such as NAO and KASPAR, help facilitate therapy for children on the autism spectrum, helping them develop social interactions and communication skills. Social robots also significantly contribute to education as classroom assistants or tutors. Robots are not considered a replacement for teachers in teaching but perform the function of assistants, and the results of numerous studies show an increase in positive learning outcomes [49].

A good example is the PEPPEER robot, which is already in use in LINK Educational Alliance elementary school. Perceiving the students’ feelings is difficult for robots, but there is an open path in this field: AI might recognise some feelings that will positively impact learning outcomes. Even today, we already have robots that recognise anger, happiness, surprise, disgust, sadness, and fear. Furthermore, a significant effort has been made to enable robots to show expressions that could be interpreted as emotions. However, it is essential to note that it is impossible not to communicate. Even if the robot is not programmed to express specific feelings, the student will perceive that the robot has emotions—a phenomenon known as the “media equation”.

The personal relationship between teachers and students will not be lost by automating certain activities. Still, on the contrary, if we assume that technology will take over routine tasks, the teacher may have more time to build relationships with students. Moreover, in terms of speed and timeliness of response, AI offers optimal solutions, which directly impact student work and motivation rate.

Based on a representative sample, we could ground research that proved that the level of awareness and knowledge of K–12 LEA teachers favoured their capacity to identify the opportunities brought by AI in K–12 schools. Discovering these positive influences, LEA K–12 teachers voiced their opinion regarding AI utility in K–12 schools. Thus, many teachers decided to implement AI in the educational process in K–12 schools in different ways: by writing assignments for developers, giving suggestions, beta testing solutions, professional development in the field of AI, making a proposal, mentoring, and teaching (helping colleagues) in the implementation of the solution, or planning to contribute to the AI project implementation and development in LEA.

6. Conclusions

The scientific contribution of this research lies in verifying insufficiently known science and providing assistance in several narrow scientific fields. It met the goals for which the project was launched, providing an analysis of the composition of teachers’ working hours and their willingness and ability to provide professional assistance in order to share knowledge, improve education within the formal group, and achieve social education goals. Our research proved that the higher the teachers’ awareness and knowledge, the easier it is for them to identify opportunities for implementing AI in K–12 schools and actively participate in this process.

The research’s limitations include its exploratory character and small sample size. Still, given that this is a pilot study for a national population (K–12 teachers in Serbia), the future research objective has excellent potential and contribution.

Limitations: Many authors have doubts about the following issues or attitudes:

- Can emotional support for students be automated?
- Can automated activities further motivate teachers?
- Only a teacher can notice shortcomings in student development.
- Only a teacher can notice socio-emotional problems in student development.
- AI cannot detect the socio-emotional context in the teaching process.
- The rough nature of technology is a big challenge for AI.
I am afraid I will lose my relationship with students and depersonalise my approach to students. We did not investigate these issues in our research, but we have already set up a methodology for future research.

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