# Student Evaluation in the Subject of Technology in Primary Schools in Slovakia

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## ABSTRACT

**Aim.** School evaluation is a sensitive process that involves teachers, students, and their parents in various ways. This article focuses on researching student evaluation by teachers in the subject of Technology in Slovak primary schools. The research aims to determine how teachers assess students in the subject of Technology.

**Methods.** As a research tool, we used a self-designed questionnaire for teachers. We analysed the respondents' answers using descriptive statistical methods. To ascertain differences in responses between qualified and unqualified teachers, we employed the chi-square test.

**Results.** By analysing the data obtained from 107 questionnaires, we found that technology teachers mostly employ an individual approach when evaluating students and emphasise the practical aspects of the subject. Among the evaluation methods, grading scales for summative student assessment prevail. At the same time, there were statistically significant differences between qualified and unqualified teachers. We also observed statistically significant differences in evaluations between qualified and unqualified teachers.

**Conclusion.** For this reason, it is necessary to ensure an increase in the number of qualified and internally motivated technology teachers in primary schools, as only such teachers can motivate and inspire their students to pursue this field of study.
**Keywords:** evaluation, teacher, Technology, knowledge, skills

## Introduction

School evaluation is an activity that can significantly help or harm students with its consequences. It influences the quality of teaching and serves as one of the most significant components of communication between teachers, students, and their parents. It reflects the goals and concepts of education and also serves as a benchmark for comparing different educational programmes. Therefore, the quality of school evaluation is at the centre of attention for educators and researchers.

It is crucial to study the evaluation processes used by teachers as it can provide insights into the quality of assessment practices (Alhareth & Dighrir, 2014).

Assessment can be formative or summative. Teachers use summative assessment to measure students' knowledge after completing the teaching of a subject. This assessment also informs the student whether they have achieved the expected standards in the subject curriculum. In contrast to summative assessments, formative assessments play a formative role in the learning situation (Taras, 2005). Teachers often use formative assessments in classrooms to identify students' educational needs, which are considered when adjusting the teaching. Through summative assessment, teachers determine students' level of understanding of the goals set in the subject curriculum. In contrast, through formative assessment, teachers identify students' educational needs and can adjust the learning environment to meet those needs.

Teachers' readiness for student evaluation has been the subject of several studies. Research on teacher evaluation in Norway suggests that a lack of shared assessment culture may also stem from vague formulations in the curriculum of different subjects regarding what can be expected from students at different grade levels (Jolle, 2014).

Several studies focus on the implementation of formative assessment in student learning. Benzehaf Bouchaib (2016) conducted research to gather information about teachers' assessment practices and identify barriers hindering the application of formative assessment in teaching. The obtained information indicates the use of various assessment strategies, from homework to written tests in the classroom, but primarily for summative purposes. Despite teachers mentioning some formative purposes, grading remains the main goal of assessment. The research author recommends professional development for teachers in areas identified by teachers themselves: grading, differentiated teaching based on assessment results, test design, providing feedback, and overall formative assessment procedures (Bouchaib, 2016). Teachers likely still consider formative assessment as requiring more time and resources rather

than an integrated part of regular teaching. It is necessary to change teachers' attitudes toward formative assessment to incorporate it regularly. Teacher education should aim to facilitate such a shift in teachers' thinking and equip them with the necessary skills to consider formative assessment as an integral part of routine teaching (Yan & Cheng, 2015). Several recent studies have explored the significance of online tools for student assessment. Authors conclude on the effectiveness of using these tools, primarily enabling instant feedback to students, statistical processing of results, and increasing student motivation. However, they also acknowledge limitations in using online assessment technologies, such as internet connectivity issues and potential time organization problems (Demirkan et al., 2017; Remmi & Hashim, 2021). Few studies focus on assessing students' psychomotor skills, with most concentrating on evaluating students' movement skills in physical education. A notable study by Tom van Rossum, Lawrence Foweather, David Richardson et al. (2019) examined how elementary school teachers perceive the assessment of basic movement skills within physical education lessons to develop a teacher-oriented movement assessment tool. They found that teachers felt the need for a movement assessment tool that would be easy and quick to use, providing valuable feedback for future teaching and learning. Teachers indicated a lack of suitable resources for assessing movement skills and a shortage of time for assessment within physical education. In this article, we will focus on the specifics of assessing students in the subject of Technology, characterized by assessing not only students' knowledge but also their motor skills.

In Slovakia, teachers follow the *Metodický pokyn č. 22/2011 na hodnotenie* žiakov *základnej* školy [Methodological Guideline No. 22/2011 on the Assessment of Primary School Students] (2011) when assessing students. According to this guideline, we can conduct student evaluation through classification, verbal assessment, or a combination of classification and verbal assessment. The school principal determines the evaluation method for each subject after consultation with the pedagogical council. Schools can decide whether to assess students in overall evaluations through grading, verbal assessment, or a combination of these evaluations. If the school chooses to use classification for student evaluation, teachers can access five classification grades: 1 — excellent, 2 — very good, 3 — good, 4 — sufficient, and 5 — insufficient. In the educational process, the ongoing assessment takes place throughout the school year and the final assessment at the end of the school year.

The summary evaluation, which combines classification and verbal assessment, consists of assigning a classification grade to the student and describing how the student achieved the educational goals in the subject. The summary evaluation through verbal assessment entails describing how the student achieved the educational goals in the subject. Suppose a student is not evaluated using the abovementioned forms for a particular subject. In that case, the report card and catalogue sheet will indicate "actively completed" if the student actively participated in the teaching of that subject, "completed" if the student was absent with a valid reason or present but unable to work

due to significant reasons, or "not completed" if the student did not work on the subject or was absent without a valid reason. In verbal assessment, the teacher has limited options to express the student's performance in the final evaluation, especially for subjects that require active participation, such as Physical education, Art, or Technology.

During evaluation, we assess students' acquired competencies by the curriculum of the specific subject and their ability to apply them in the following areas:

- Communication skills, particularly oral and written abilities.
- Reading literacy.
- Language skills in the state language, mother tongue, and foreign languages.
- Digital competencies.
- Mathematical literacy and natural sciences.
- Social competencies.
- Multicultural competencies.
- Manual skills and their application in practical exercises.
- Artistic and psychomotor skills.
- Problem analysis and problem-solving abilities.
- Personal qualities such as understanding, tolerance, and friendship.
- Self-control, behaviour regulation, health and environmental protection, and ethical principles (Ministerstvo školstva, vedy, výskumu a športu Slovenskej republiky, 2011).

## Characteristics of the subject Technology

We teach Technology in Slovakia as part of the educational field of Human and the World of Work. It is compulsory for primary school students in the 5th to 9th grades. The subject aims to teach students how to safely use technical materials, tools, equipment, and devices and to develop attitudes and values related to work and the environment. Students learn to see work activities as opportunities for self-realisation, the development of creativity, and entrepreneurial thinking. By understanding various fields of human activity and the world of work, they are better equipped to make decisions regarding their future professional orientation. The specific knowledge, skills, habits, attitudes, and competencies that a student should acquire in the teaching process in Technology are determined by the teacher in specific objectives when planning instruction. When formulating these specific goals, the teacher refers to the performance standards of Technology, which become part of the teacher's methodological preparation for a specific class of the subject Technology (Ďuriš & Stadtrucker, 2020).

A specific characteristic of Technology is its practical nature, which emphasises acquiring skills through working with various materials (Bánesz et al., 2020). Students acquire basic work skills and habits, develop creative technical thinking, and learn to plan, organise, and evaluate work activities (Technology for the 2nd

Stage of Primary School). The implementation of practical activities in the subject of Technology requires specialised classrooms with appropriate material and technical resources. However, not all schools in Slovakia have access to such facilities. Through national projects, the Ministry of Education of the Slovak Republic has provided material and technical equipment to 226 schools, representing only 17 % of the total number of schools. The practical nature of the subject, focused primarily on acquiring skills and attitudes, complicates the assessment of students for teachers. Especially when not all schools have the necessary material and technical resources for practical skill training. In such cases, it may be easier and more convenient for teachers to focus on theoretical teaching and assess students' knowledge without practical skill training. For this reason, we have decided to investigate how teachers assess their students in the subject of Technology.

## Goals and Methodology of the Research

The goal of this study is to determine how teachers assess students in the subject of Technology. To achieve this goal, we have posed the following questions:

RQ1: Which criteria do teachers in practice prefer when assessing students?

RQ2: How do teachers assess students at the end of the school year?

RQ3: What forms of ongoing assessment do teachers use?

RQ4: Does the technology teacher's qualification for the teaching of Technology influence their methods of evaluation?

The chosen method to achieve the set goal was a questionnaire. We targeted the questionnaire at primary school teachers of Technology. It consisted of eighteen items, seven of which focused on gathering identification data. The sample consisted of 107 respondents, 14 men and 93 women. Data collection took place from February 2023 to the end of March 2023.

To gather information on the assessment methods used by teachers of Technology in primary schools, we created an online questionnaire using survio.com. We then published the questionnaire link in the 'Technology Teachers' group on the social network Facebook and distributed it via e-mail to several schools and teachers in the Banská Bystrica region. This group has 2,703 members, including technology teachers, art teachers, kindergarten teachers, and other individuals interested in topics discussed within the group. However, we explicitly targeted the questionnaire at teachers who teach Technology. The number of Technology teachers in primary schools is not known, but we can base it on the number of primary schools in Slovakia. There were 1186 primary schools in Slovakia in 2023 (Ministerstvo školstva, vedy, výskumu a športu Slovenskej republiky, 2023). We can assume that each school has one teacher of the subject of Technology. However, we cannot say how many of them are registered on the FB Teachers of Technology page. We received 107 completed questionnaires.

All questionnaire items were marked as mandatory and therefore it was not possible to avoid any of the questions.

The first seven items of the questionnaire focused on identification. The first question concerned gender, the second item sought to determine the age distribution of the respondents, and the third item aimed to gather information about the respondents' teaching experience. The fourth item inquired about how many years each respondent has taught Technology. The fifth item aimed to determine whether the teachers teaching Technology are qualified for the subject or teach it without proper qualification. The sixth and seventh items explored the combination of subjects taught by the respondents. The eighth item inquired about the respondents' motivation to teach this subject. Due to the scope of the thesis, items 6-8 and 17-18 will not be addressed as they are unrelated to the research questions set out in this thesis and their treatment will be left for possible further extension of the thesis.

The subsequent items focused directly on student assessment in the subject. The ninth item was open-ended and aimed to identify the criteria used by teachers to assess students in the subject. In items eleven and twelve, we asked about the assessment methods at the end of the year and during the school year. The thirteenth item asked, "What other forms of ongoing assessment do you use?". The fourteenth item aimed to understand the importance given to the subject of Technology compared to other subjects. We were interested in respondents' opinions on how students in Technology should be assessed. The fifteenth item concerned the frequency of providing feedback to students on their work in the subject. In the sixteenth item, we asked the respondents to indicate the assessment methods used for students. The seventeenth item asked respondents about the impact of their assessments on students' motivation and their relationship with the subject. The eighteenth item inquired whether respondents considered individual differences among students when assessing them in the subject. All items in the questionnaire were constructed as closed or semi-closed questions. Starting from the eighth item, we also gave the respondents the option to provide their own response or choose "other."

## Results of the research, discussion

The research received responses from 107 participants, 93 women and 14 men. We found the highest representation in the age group of 40-49 years (39 %) and the age group of 30-39 years (25%). We divided the respondents into four categories based on the length of their teaching experience. The highest percentage consisted of experienced educators with 21 or more years of experience (34 %). Within the questionnaire, 41 % of the respondents stated that they had completed their teacher training in Technology (Table 1).

**Table 1**

*Basic characteristics of the research sample (N = 107)*

| | | | |
|---|---|---|---|
| Gender | Women | 93 | 87 % |
| | Men | 14 | 13 % |
| Age | Up to 29 years | 5 | 5 % |
| | 30-39 years | 27 | 25 % |
| | 40-49 years | 42 | 39 % |
| | 50-59 years | 26 | 24 % |
| | More than 60 years | 7 | 7 % |
| Pedagogical practice | Up to 5 years | 16 | 15 % |
| | 5-10 years | 20 | 19 % |
| | 11-20 years | 34 | 32 % |
| | More than 21 years | 37 | 34 % |
| Number of years of teaching technology | Up to 5 years | 59 | 55 % |
| | 5-10 years | 16 | 15 % |
| | 11-20 years | 19 | 18 % |
| | More than 21 years | 13 | 12 % |
| Qualification | Qualified | 44 | 41 % |
| | Unqualified | 63 | 59 % |

*Source.* Own research.

We analysed the respondents' answers using descriptive statistical methods. We addressed the following research question:

RQ1: Which criteria do teachers prioritise when evaluating students in practice?

To answer this question, we found evaluating the respondents' answers to items 9, 10. helpful. Item 9 was opened: What criteria do you use to assess pupils in the subject Technology? Respondents could write in their own answers. While evaluating item 9, we categorised the respondents' statements. We identified five groups of responses: evaluation focused on effort, students' interest, assessment of student's knowledge (mainly through didactic tests), evaluation of students' skills, creativity, and engagement in class.

**Table 2**

*Respondents' Answers to Item 9*

| **According to what criteria do you assess pupils in the subject Technology?** | **Frequency** | **Percent (%)** |
|---|---|---|
| engagement in class | 26 | 24 |
| pupils' interest, effort | 32 | 30 |
| assessment of pupil's knowledge | 18 | 17 |
| assessment of pupils' skills | 30 | 28 |
| creativity | 5 | 5 |

*Source.* Own research.

We found that the criterion most preferred by teachers in assessing students in technical classes is generally the student's approach to the subject and its content. This criterion is crucial from the perspective of formative assessment because it reveals how open the student is to learning and developing knowledge, skills, and habits in Technology. About 30 % of teachers evaluate a student's effort and interest, while 28 % of teachers primarily consider students' skills during assessment (Table 2). From our perspective, this is positive, as the subject of Technology is one of the few subjects focused on developing students' vocational skills. 24 % of teachers assess students' activity in class, 17 % focus on students' knowledge, and 5 % consider students' creativity (Botló, 2023).

**Table 3**

*Respondents' Answers to Item 10*

| **Do you strive to maintain a balance in evaluating knowledge and practical skills?** | **qualified teachers** | **unqualified teachers** | **together** |
|---|---|---|---|
| Practical skills are more important than knowledge, in my opinion. | 10 % | 20 % | 30 % |
| I believe that both knowledge and skills are equally important in the evaluation process. | 17 % | 10 % | 27 % |
| I strive for an individual approach with each student. | 14 % | 29 % | 43 % |

*Source.* Own research.

Item 10 was semi-closed. Respondents were given a choice of 3 answers and if none of them represented their opinion, they could write it in the option "other".

By processing the responses to the tenth item, we have found that respondents perceive Technology primarily as a subject whose practical and theoretical components must be considered, although only partially. Most respondents (43 %) differentiate individually for each student, determining which aspect they prioritise when evaluating a specific student. In the „other" option, two respondents indicated that they take into account 80 % of the skills and 20 % of the knowledge of the pupil in the assessment. However, this answer belongs to the answer option „Practical skills are more important than knowledge, in my opinion", so we have included them there (Table 3).

RQ2 How do teachers assess students at the end of the school year?

This question was answered by evaluating the participants' responses to items 11 and 14. Item 11 was semi-closed. Respondents were given a choice of 3 answers and if none of them represented their opinion, they could write it in the option „other".

In item 11, regarding the overall assessment, the responses provided options defined by *Metodický pokyn č. 22/2011 na hodnotenie* žiakov *základnej* školy [Methodological Guideline No. 22/2011 on the Assessment of Primary School Students] (2011). The pedagogical council of each school selects from these options the method of assessment for the subject of Technology. More than 80 % of the respondents stated

that they exclusively use classification grades for the overall assessment of students in Technology. A relatively significant portion of schools (19 %) do not classify students in the subject of Technology and only indicate "actively completed," "completed," or "not completed" on their report cards (Table 4).

**Table 4**

*Respondents' answers to item 11*

| **In the subject of Technology, I assess students overall…** | **qualified teachers** | **unqualified teachers** | **together** |
|---|---|---|---|
| using classification grades (1-5) | 30 % | 51 % | 81 % |
| using verbal evaluations such as "actively completed" or "not completed" | 11 % | 8 % | 19 % |

*Source.* Own research.

Also of interest was item 14, which asked how teachers would evaluate their students in Technology classes if they had free choice. Item 14 was semi-closed. Respondents were given a choice of 4 answers and if none represented their opinion, they could write it in the „other" option. Three respondents used the "other" option. In this option, they expressed an opinion in favour of classifying pupils, but with a broader scale than grades 1-5. As this was a pupil classification, we included their responses in the „using classification grades" option (Table 5).

**Table 5**

*Respondents' answers to item 14*

| **Regarding the assessment of students of Technology, I think…** | **qualified teachers** | **unqualified teachers** | **together** |
|---|---|---|---|
| pupils should be graded, with lower demands than in other subjects | 7 % | 16 % | 23 % |
| pupils should be graded, with the same demands as in other subjects | 27 % | 18 % | 45 % |
| pupils should only be graded completed/uncompleted | 5 % | 18 % | 23 % |
| pupils should be assessed verbally | 2 % | 7 % | 9 % |

*Source.* Own research.

Most respondents conservatively chose to use classification grades, believing Technology should be treated equally to other subjects (Botló, 2023). The answer "other" was not used by anyone.

RQ3 What forms of formative assessment do teachers use?

This question was answered by evaluating the participants' responses to items 12 and 13. Item 12 was semi-closed. Respondents were given a choice of 3 answers and if none of them represented their opinion, they could write it in the option „other".

By evaluating the participants' responses to item 12, we have found that in formative assessment, the predominant method of evaluating students is through classification grades (Table 6). 51 % of the respondents only use grades to assess students in Technology. Another 8 % assess students using percentages and classification grades, while 24 % add verbal evaluations alongside grades. 16 % of the respondents stated that they use verbal evaluations, but nine respondents only indicated "actively completed" or "not completed" for the final assessment. This form of feedback is acceptable, although it is likely that no detailed assessment of the student reaches the parents, and indeed, none reaches the next level of education.

**Table 6**

*Respondents' answers to item 12*

| In the subject of Technology, I assess pupils continuously… | qualified teachers | unqualified teachers | together |
|---|---|---|---|
| using classification grades (1-5) | 20 % | 31 % | 51 % |
| using verbal evaluations, describing how well the student has achieved the learning objectives | 8 % | 8 % | 16 % |
| using a combination of classification grades and verbal evaluations | 13 % | 20 % | 33 % |

*Source.* Own research.

The forms of formative assessment used by teachers in the subject of Technology were the subject of item 13. In their responses, they could choose from options such as "none," "teacher's formative assessment," "self-assessment," "peer assessment," and "other." Respondents could have chosen more answers.

**Table 7**

*Respondents' answers to item 13*

| What forms of formative assessment do you use? | qualified teachers | unqualified teachers | Together | Percent |
|---|---|---|---|---|
| None | 4 | 8 | 12 | 11 % |
| formative teacher evaluation | 8 | 13 | 21 | 20 % |
| pupil self-assessment | 25 | 37 | 62 | 58 % |
| peer assessment of the pupil | 26 | 37 | 63 | 59 % |

*Source.* Own research.

According to the responses in our questionnaire, most respondents use self-assessment by students and peer assessment among students (Table 7). These findings align with Bouchaib's research (2016) and are highly positive. For the development of each student, it is crucial to assess not only their abilities, knowledge, talents, skills in the subject of Technology but also their personal and career growth. None of the respondents took the opportunity to write their own answer.

Item 15 investigated how often teachers provide feedback to their students on their progress in the subject of Technology. Item 16 was closed-ended and respondents were given a choice of 3 responses.

**Table 8**

*Respondents' answers to item 15*

| How often do you give feedback to students? | qualified teachers | unqualified teachers | together |
|---|---|---|---|
| After testing | 7 % | 10 % | 17 % |
| After the end of the unit | 7 % | 7 % | 14 % |
| I try in every lesson | 27 % | 42 % | 69 % |

*Source.* Own research.

Feedback on pupils' progress is given to pupils in almost every lesson by 69% of teachers, which is beneficial both for pupils and for teachers themselves, who recognise the importance of feedback for the pupil. It is strange that the effort to provide feedback is declared mainly by unqualified teachers. As they are not in favour of grading, they seem to have a need for more frequent feedback in some form (Table 8). These were the subject of the item 16.

In item 16, we investigated what activities teachers use to assess pupils. The item was semi-closed with 5 response options and if none of the responses were appropriate, they could add their own response in the „other" option. Respondents could have chosen more answers.

**Table 9**

*Respondents' answers to item 16*

| What activities do you use for student assessment? | qualified teachers | unqualified teachers | Together | Percent |
|---|---|---|---|---|
| Oral testing | 12 | 6 | 18 | 17 % |
| Written tests | 15 | 15 | 30 | 28 % |
| Presentations | 17 | 17 | 34 | 32 % |
| Projects | 32 | 47 | 79 | 74 % |
| Practical testing | 27 | 45 | 72 | 67 % |
| Other | 6 | 2 | 8 | 7 % |

*Source.* Own research.

Teachers use mostly projects and practical testing for assessment in the subject of Technology (Table 9). Since the subject of Technology is intended to be primarily practical in nature, the results of the evaluation of this item suggest that teachers tend to assess students' practical skills. This is supported by the responses in the „other" option where respondents reported evaluating pupils' products.

RQ4 Does the technology teacher's qualification for the teaching of Technology influence their methods of evaluation?

The fact that there is a significant number of unqualified teachers (59 %) among those teaching Technology suggests that there may be differences in the responses between these two groups.

As part of the evaluation of item 10, we found some differences in the responses of qualified and unqualified teachers. Among unqualified teachers, nearly half of them use an individual approach when assessing students in the subject of Technology. For nearly a third of them, practical skills are more critical. In contrast, the order is different among qualified teachers in the Technology field. The most considerable portion believe that knowledge and practical skills are equally important. The second-largest group takes an individualised approach to assessing students (Table 3).

We also identified differences between qualified and unqualified respondents in their responses to item 14. Among teachers who are not qualified to teach the subject of Technology, the majority would choose not to classify students and would instead indicate "actively completed" or "incomplete" on the report card or use classification grades with the same requirements as in other subjects (Table 5). Respondents who are qualified to teach the subject of Technology would grade students with the same classification grades as in other subjects.

Items that contained only a single-choice response (10, 11, 12, 14, 15) we tested for differences in the responses of qualified/unqualified teachers. For testing, we used the chi-square test of independence. We tested the null hypothesis: There is no statistically significant relationship between the answers of qualified and unqualified respondents. Alternative hypothesis: there is a statistically significant relationship between the responses of qualified and unqualified respondents. All prerequisites for the implementation of the test were met (Table 3, 4, 5, 6, 8). We performed a Chi-Square test for each item and calculated Cramer's V. We chose a 5% (0.05) level of significance for the tests. In Table 10, the p value is the probability of the error we make when we reject the null hypothesis. If p is less than 0.05, we reject the null hypothesis and accept the alternative hypothesis. If p is more than 0.05, we cannot reject the null hypothesis.

**Table 10**

*Chi-Square test for items 10-15*

| Item | $\chi 2$ | P | Cramer V |
|---|---|---|---|
| 10 | 7.23 | 0.02 | 0.26 |
| 11 | 2.73 | 0.10 | 0.18 |
| 12 | 1.20 | 0.55 | 0.11 |
| 14 | 14.16 | 0.00 | 0.36 |
| 15 | 0.58 | 0.74 | 0.07 |

*Source.* Own research.

The results of the statistical test showed a significant difference between the observed frequencies of qualified and unqualified teachers' opinions in items 10 and 14 compared to the expected frequency. Since p is less than 0.05, we reject the null hypothesis and conclude that responses to items 10 and 14 depend on whether the respondent is qualified to teach the subject of Technology or not. The strength of dependence is indicated by Cramer's V = 0.26 (item 10), or 0.36 (item 14) (medium association). We cannot reject the null hypothesis for the other items (11, 12, 15).

## Conclusion

The research results have shown that Technology teachers primarily use an individual approach when assessing students and place greater emphasis on the practical aspect of the subject. Classification grades are the most prevalent assessment method for summative evaluation of students. We highly appreciate that teachers also utilise self-assessment and peer assessment in the formative assessment of students. Teachers are aware that their evaluations can impact students' motivation and increase their interest in choosing technical fields in secondary school education. This can positively impact the profile of high school graduates, as Slovakia has long been struggling with low student interest in studying at secondary schools with a technical focus (Hašková & Bánesz, 2015).

Our research identified significant differences in student assessment between qualified and unqualified teachers in two questionnaire items. For this reason, it is necessary to ensure an increase in the number of qualified and internally motivated Technology teachers in primary schools, as only such teachers can motivate and inspire their students to pursue this field of study.

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