Increasing Students' Motivation to Study Technical Subjects through Changes in Assessment

Alena Hašková[1], *Florián Danko*[2], *Ján Záhorec*[3]

DOI: https://doi.org/10.53349/re-source.2026.is1.a1531

Abstract

Various findings indicate that low motivation among secondary vocational school students remains a primary challenge in the teaching of technical subjects. Many teachers assume that a change of the traditional assessment model, which relies on a numerical scale from 1 (excellent) to 5 (insufficient), could significantly enhance student motivation to study the technical subjects. This paper proposes an alternative evaluation system based on the accumulation of points, providing both a practical example and the results of its pilot implementation. Within this framework, negative motivation is mitigated as the teacher no longer primarily seeks to highlight the weaknesses or errors of a student. Instead, the system rewards achievements through the allocation of points. Furthermore, the responsibility for the final grade is transferred from the teacher to the student, who is empowered to determine their own final outcome based on performance.

Keywords: Secondary Vocational Education, Students Assessment, Motivation to Study the Technical Subjects

1 Challenges Related the Education Sector of Secondary Vocational Schools

[1] Faculty of Education, Constantine the Philosopher University, Dražovská 4, Nitra, Slovakia.
E-Mail: ahaskova@ukf.sk
[2] Secondary technical school of electrical engineering, Hálová 16, Bratislava, Slovakia.
E-Mail: florian.danko@spsehalova.sk
[3] Faculty of Education, Comenius University, Račianska 59, Bratislava, Slovakia.
E-Mail: zahorec@fedu.uniba.sk

In relation to secondary vocational schools, a significant paradox currently exists. On the one hand, there is a clear national and societal requirement to support the further development of this education sector. This involves enhancing both the quantity and the quality of graduates to meet the demands of the labour market for a properly trained and qualified workforce. So, the main task of vocational schools is to focus on developing well-trained, motivated, higher-order skills, industry-responsive and globally competitive labour force which are needed in globalizing world (Marope et al., 2015).

From this perspective, secondary vocational schools are widely acknowledged as critical components of the national educational system. Conversely, within society, these institutions are often perceived as inferior and are frequently viewed as being intended for those with insufficient academic abilities or poor levels of attainment. Furthermore, there is a persistent lack of interest among the younger generation regarding study programmes that focus on technology and science (Pavelka et al., 2020; Azeem & Omar, 2019).

In the context of the system of vocational schools this can be partially influenced by two factors, which are insufficient infrastructure of the offered education and training and (Li, Zhou & Yuan, 2017).

In our view, the limited funding available for infrastructure should not be interpreted solely as a means of procuring technical equipment. This is particularly relevant as the existing facilities and training centres in these schools frequently lag behind contemporary industrial standards. Furthermore, investment is required for the continuing professional development of staff, whose current knowledge and skills may not always align with latest industry trends. Establishing an appropriate infrastructure within the vocational education environment necessitates, among other factors, bringing education into closer alignment with industrial practice. This requires a flexible curriculum with updated content, the modernisation of teaching methodologies, and a refined system for the assessment of students. As the world outside the classroom evolves, educators are compelled to reconsider the strategies they employ when teaching subjects with a focus on technology. Or rather they should reconsider them and reevaluate their upgrading or changing, e. g., taking into consideration current job requirements, existing gaps between the world of work and the world of education, need to align learning objectives to social needs, and new demand in education due to globalization (Wieckenberg, 2014; Kwami & Manabete, 2022).

Science and technical subjects are often considered to be difficult and not interesting for students (Tomková, 2025). In studies conducted to uncover possible reasons for disinterest, students most frequently cited the difficulty of science subjects as a reason (Fančovičová & Kubiatko, 2015).

One challenge that teachers exhibit in teaching technical subjects is their inability to use befitting teaching methods for certain tasks. According to Modebelu and Duvie (2012) one of the most effective teaching styles is the one which is based on a combination of teaching techniques, knowledge of subject matter, enthusiasm for teaching and sensitivity to another's own characteristics. Similar findings resulted from a panel discussion with the staff of

secondary vocational schools, mainly the ones focused on information technologies, the aim of which was to identify difficulty aspects of the vocational education and training, specifically to identify:

- what are the causes of difficulty in teaching technical subjects,
- what are the effective ways of motivating students to study technical subjects and how is it possible to maintain the motivation of students for a longer time, and
- what makes it possible to attract students´ attention more significantly in the teaching of technical subjects (Hašková, Danko, Pavera & Sałata, 2024).

One of the most significant findings emerged from the discussion among the panellists regarding the potential for motivating students to engage with the subject matter of required technical disciplines. This also encompassed the various methods through which student motivation could be sustained over an extended period. The initial responses from the panellists to these inquiries were somewhat sceptical; indeed, several participants suggested that the challenges addressed in these questions were largely Insoluble. However, as the discussion progressed, this initial scepticism diminished. The participants began to link potential solutions for student motivation to the overarching system of student evaluation. Several panellists described examples of successful outcomes following the discontinuation of traditional grading in specific subjects. This transition led to increased student motivation and consequently resulted in higher levels of academic attainment.

2 The Used Methods of Student Assessment: Why and How to Change Them

Motivating students to acquire new knowledge, skills, and experiences is an essential component of the professional responsibilities of a teacher. Regarding technical subjects, common methods for motivating students include encouraging active participation in various experimental activities and rewarding the mastery of specific tasks. Furthermore, students are often encouraged to engage in competitions or the development of projects related to the discipline. Other strategies involve highlighting the lives of prominent individuals who successfully pursued new knowledge or identified a solution to a problem, as well as those who encountered failure but persevered. However, teachers are increasingly struggling with student disengagement and are asking for ways to motivate students.

But they are asking not only for ways to motivate students, they also are asking about appropriate ways to motivate students more towards self-study, where the students would take responsibility for themselves, for their own learning. That is why we were interested by the finding, that emerged from the afore-mentioned discussion, namely that the low students´ motivation to learn could be associated with the way in which they are assessed, what would mean that the traditionally used system of students evaluation has rather demotivating than

motivating, or encouraging influence on them. We took into the consideration also the fact that students often complain about the unfairness of teacher evaluations. They feel that the final grade is not primarily in their hands, but in the hands of the teacher.

Regarding the traditional method of evaluating pupils through a numerical grading scale ranging from 1 (excellent) to 5 (insufficient), it is important to note that this system has a long historical tradition in Slovakia. This method of assessment was established by Maria Theresa, Queen of Hungary and Bohemia, who introduced the system alongside compulsory school attendance throughout the Austro-Hungarian Monarchy in 1774. Although numerous modifications have occurred over the subsequent two and a half centuries, the fundamental essence of the system has remained unchanged. Although the question is currently being raised on one side whether the evaluation of a student by grades is no longer outdated and experts have different opinions, everyone agrees on the fact that pupils and students should be assessed.

Within their teaching practice, teachers are faced with a dilemma regarding various approaches to assessment. They must consider what to evaluate, how to conduct such evaluations, and how these processes will influence their subsequent teaching as well as the progress of their pupils or students. It is now widely recognised that assessment constitutes more than mere classification. It serves multiple functions beyond simply providing information on the extent to which pupils or students have acquired specific knowledge or competences. In addition to this evaluative role, assessment is intended to facilitate student progress throughout the learning journey and to refine the ways that teachers work to ensure they remain as effective and beneficial as possible.

In our opinion, attempts to replace grading by means of verbal assessment have emerged from the recognition that the conventional system focuses exclusively on demonstrated learning outcomes. This existing model often fails to account for the diligence of pupils and students or the significant effort they have invested to achieve those results. Fair grading is always a question of what we consider fair. If we start from the student's potential, we know the students have different potentials. Therefore, the grade does not express entirely fairly what a student knows.

Conversely, if grading is perceived as a form of feedback, it essentially serves to identify the current progress of a student on the path toward acquiring specific knowledge and skills. In certain subjects, it is possible to define precisely what a student must master, or rather which grade will be assigned based on a specific number of errors. For example, if a student makes fifteen errors in a dictation, this will result in a grade of five. That is relatively objective. But it is not always that simple, and mainly if assessing students´ learning achievements in technical subjects. That means that the question stated in the sub-title of this section "why and how to change the used way of assessment" applicable to every taught subject or learning unit, it is our view that this should certainly be considered in the context of technical disciplines.

3 Example of Good Practice in the Use of Alternative Student Assessment to Increase Study Motivation

In this study, we elected to replace traditional grading within selected technical subjects with a system based on a predetermined and fixed number of points. Consequently, a grade is only assigned to the student at the conclusion of the classification period. While this model initially appears to offer numerous advantages, these benefits were further confirmed during the experiment through both direct observation and feedback provided by the students. Under this system, the teacher no longer focuses primarily on identifying the weaknesses or mistakes of the student; instead, they reward the successes the student has achieved through the allocation of points. This assessment model effectively eliminates the possibility of continuous negative motivation for students.

One of the most important advantages of this type of assessment is that students have the final assessment in their own hands. In this way the responsibility for the final grade is postponed from the teacher to the students, who can determine for themselves the final grade they will receive at the end of the grading period based on the number of points they have earned. To ensure this system remains sustainable and accessible, it must be defined with the utmost simplicity. Consequently, the framework can be summarised by three fundamental rules:

1. Throughout a single classification period, which corresponds to one half of the academic year, a student can earn a maximum of 100 points. This total, representing 100 per cent of the available marks, is divided into the following categories *limited* and *unlimited* points. Approximately 80 points (80%) are *limited*. The remaining 20 points (20%) can be obtained in other ways and are referred to as *unlimited* points.

   The first category, defined as *limited points* is linked to mandatory assignments, written tasks, tests, and protocols. If a student does not achieve the maximum number of restricted points, they have the opportunity to compensate for this deficit only through the acquisition of unlimited points.

   So-called *unlimited points* can be obtained in different ways, but they are not related to obligatory assignments. This includes primarily voluntary homework, papers, oral answers, competitions, and different kinds of activities somehow related to the subject. There is no given maximum of the unlimited points, as their number depends solely on the approach, diligence and activity of the student himself. However, these points are somewhat more difficult to obtain, because for example, for one oral answer a student can obtain, for example, only 5 points, which in case of losing 10 points in a written work means at least 2 oral answers. The second aspect of the difficulty is that a student is "forced" to perform some his own activity during the whole assessed period, as to obtain a good assessment at the beginning of the period and then to remain passive in class is not enough to obtain a sufficiently good grading at the end of the assessed period.

2. Every point earned is recorded and retained. All points, whether limited or unlimited, are aggregated to form a cumulative total., are added up. The teacher can only award positive points; reducing the number of the gained points is not possible. Points once earned by a student cannot be lost. The minimal sum of the gained points is 0.5 points. At the end of the assessed period grades are assigned according to the total number of the gained points as follows:

1	100 – 85 points	100% – 85%
2	84.5 – 70 points	84.5% – 70%
3	69.5 – 50 points	69.5% – 50%
4	49.5 – 30 points	49.5% – 30%
5	29.5 – 0 point	29.5% – 0%

3. Since in this method of assessment the teacher has practically no possibility to impose any punishments, and the teaching process is not only about learning, but also about upbringing, it was necessary to implement a certain form of "sanctions", or punishments, into this assessment system. While using this system already for a longer time, it has been necessary to resort to these sanctions only in several very exceptional cases. These “sanctions” are something like the awarding of so-called yellow cards. If a student receives 3 yellow cards, he loses the opportunity to collect further unlimited points. This may seem like a very weak punishment or sanction, but since unlimited points also include oral answers, it is impossible for such a student to enhance his final grade at the end of the year with an oral answer.

Following the pilot implementation of this alternative assessment system, it was necessary to resolve certain ambiguities. Consequently, the entire framework was refined based on the specific requirements and collective feedback of the students. It is therefore not a system that would be created and introduced in an authoritative manner, but was continuously created, modified and improved also based on the comments and suggestions of the students themselves. For example, one of the first unresolved questions which arose was what to do with the points that were obtained in addition, i.e. above the given limit of the obtained grade. In a common discussion with students as the fairest solution was decided to transfer all points earned to the subsequent period (the second half of the academic year) and at the same time to double the maximal number of the points earned in the second evaluated period to 200 points (100%). The final grading at the end of the second half of the academic year is then set as follows:

1	200.0 – 170 points	100% – 85%
2	169.5 – 140 points	84.5% – 70%
3	139.5 – 100 points	69.5% – 50%
4	99.5 – 60 points	49.5% – 30%
5	59.5 – 0 point	29.5% – 0%

Two significant consequences arise from the principles stated above. Firstly, it is essential for students to strive to accumulate as many points as possible during the initial assessment

period. Secondly, if a student achieves a grade of two in the first half of the academic year, it becomes impossible for them to fail the subject overall, as they will have already secured 70 points toward their cumulative total. The situation is similar for a student who got during the first half of the academic year 60 points and has got a grade of 3 (good). Consequently, such a student gains the certainty that they will successfully pass the subject by the conclusion of the academic year, as they have already secured the required 60 points.

4 Conclusion

Unfortunately, many teachers continue to adhere to the convention that the only effective method of evaluating students is through the standard grading scale ranging from 1 (excellent) to 5 (insufficient). It is understandable that switching from one day to another to a completely different way of assessing would be very difficult, not only for teachers, but undoubtedly also for students and their parents.

The standard grading system has been used as a method for too long to be completely changed without any negative consequences. In addition to teachers, most parents often reject innovative assessment methods and cannot imagine them. Verbal assessment is insufficient for them, because they cannot use it to rank their children among their peers and compare the level of their results with the other ones.

From our perspective, however, this system seems to have number of advantages, which were confirmed to us either by means of our observations and experiences or by means of direct feedback from the students. In this system, negative motivation of students is not possible as the teacher no longer primarily looks for ways to point out the weaknesses and mistakes of the student, but on the contrary, rewards through the given points the successes that the student has achieved. Moreover, responsibility for the final grade is transferred from the teacher to the student, who can determine for himself the final grade he will receive.

Acknowlegements

This paper was written in the context of the KEGA project No. 009UKF-4/2023 Virtual reality in PLC systems programming.

References

Azeem, N., & Omar, M. K. (2019). Students' Interests in Technical and Vocational Education and Training (TVET) Program: A Systematic Review. The 5th International Conference on Educational Research and Practice (ICERP) 2019: Educating the Digital Society: Integrating Humanistic and Scientific Values, 158–165. Faculty of Educational Studies, Universiti Putra Malaysia (UPM), Serdang, Selangor, Malaysia.

Fančovičová, J., & Kubiatko, M. (2015). Záujem žiakov nižšieho sekundárneho vzdelávania o biologické vedy [Interest of lower secondary education students in biology sciences]. *sciED Scientia in educatione, 6*(1), 2–13.

Hašková, A., Danko, F., Pavera, L., & Sałata, E. (2024). Difficulty Aspects of the Vocational Education and Training. *TEM Journal 13*(4), 3259-3265.

Kwami, U. A., & Manabete, S. S. (2022). Methods of Teaching Technical Subjectsin Technical Colleges and Technological Insitutions: Issues and Solutions. *International Journal of Research and Advancement in Educational Methods*, *13*(1), 1–11.

Li, H., Zhou, L., & Yuan, Z. (2017). The Main Problems Faced by Higher Vocational Education and the Countermeasures. Advances in Computer Science Research (ACSR), vol. *76*, 7th Int. Conf. on Education, Management, Information and Mechanical Engineering (EMIM 2017), 1564–1767. Atlantis Press.

Marope, P. T. M., Chakroun, B., & Holmes, K. P. (2015). *Unleashing the potential: Transforming technical and vocational education and training.* UNESCO Publishing.

Modebelu, M. N., & Duvie, A. N. (2012). Innovative Methods and Strategies for Effective Teaching and Learning. *Mediterranean Journal of Social Sciences,* vol. *3*(13), 145–154.

Pavelka, J. et al. (2020). *Záujem žiakov základných škôl o technické činnosti a technické vzdelávanie*. [Interest of lower secondary school students in technical activities and technical education], 2nd ed. Prešov, University of Prešov.

Tomková, V. (2025). The impact of Experimental Problem-Solving in Technical Education on Students´Knowledge Acquisition. *R&E Source, 12, Special Issue 1 To the Roots: Engineering Pedagogy,* 382–389.

Wiekenberg, U. (2014). *Modern training and teaching methods*. 47 p. Institut für Bildungstransfer, Germany.

