

PAPER

Motivation Risks in Teaching Students at Secondary Technical Schools

Dana Dobrovská, David
Vaněček(✉)

Masaryk Institute of Advanced
Studies, Czech Technical
University in Prague, Prague,
Czech Republic

david.vanecek@cvut.cz

ABSTRACT

Motivation has long been of interest to many educational researchers, as it is seen as an essential ingredient in effective teaching and learning. Motivated students are more likely to be eager to learn and more willing to accept the challenges that come with the learning process. In our research, we wanted to specify the attitudes of secondary technical school students towards their studies and to find out what motivates and demotivates them. We aimed to determine potential risks to motivation (demotivators). We hypothesized that students' intrinsic motivation could be strengthened by teachers if classes were seen as useful, interesting, and inspiring. Having chosen a questionnaire as our research method, we addressed more than 200 secondary technical schools from a public database and asked their management for permission to send a questionnaire on motivation risks to their students. The body of the questionnaire included items asking students to assess 8 potential negative factors, which could represent risks in motivation. Our research sample included 665 responses from 10 technical study programs. The Fuller method of paired comparison was used for our data analysis. The answers from students from various schools, school locations, years of study, and study programs did not show many differences when respondents indicated the primary motivation risks for their study. The impact of risky situations on students' motivation to study technical subjects was dominantly connected with their cognitive needs, followed by social needs. Surprisingly, in the students' answers, not much attention was dedicated to the achievement needs.

KEYWORDS

motivation, demotivation, technical subjects, secondary technical schools, attitudes

1 INTRODUCTION

The psychological term *motivation* describes why a person does something, and it is considered the driving force behind human actions. It is what drives individuals to pursue certain goals, overcome challenges, and persist in the face of adversity. Motivation includes the biological, emotional, social, and cognitive forces that

Dobrovská, D., Vaněček, D. (2023). Motivation Risks in Teaching Students at Secondary Technical Schools. *International Journal of Engineering Pedagogy (iJEP)*, 13(8), pp. 20–32. <https://doi.org/10.3991/ijep.v13i8.44487>

Article submitted 2023-08-29. Revision uploaded 2023-10-13. Final acceptance 2023-10-16.

© 2023 by the authors of this article. Published under CC-BY.

activate human behaviour. It is the process that initiates, guides, and maintains goal-oriented behaviours [1].

2 LITERATURE REVIEW

Motivation is far from a unitary construct. Researchers commonly speak of ‘motivation’ without clarity regarding a specific theory or conceptual framework. Although different theories rarely contradict one another outright, each theory emphasizes different aspects of motivation, different stages of learning, different learning tasks and different outcomes. To avoid conceptual confusion and to optimize the theory-building potential of work, researchers are encouraged to explicitly identify their theoretical lens, to be precise in defining and operationalizing different motivational constructs, and to conduct a careful review of theory-specific literature early in their study planning. Our literature review focuses on those specialized in motivation – motives and demotives in learning.

2.1 Theories of motivation

Motivation theory is the study of how to learn and understand what inspires a person to pursue a specific result. This theory has many uses, including psychological and sociological, but it’s also important for education or businesses.

The 3 most influential theories of motivation are those of Maslow, McClelland and Hertzberg. Although they differ in some approaches, they operate with 3 basic concepts: *needs, motives, and drives*:

- The need is a feeling of deficiency. It is a kind of natural mental programming that makes people want things. Needs essentially motivate them into action, as a stimulated need leads to the inner tension that drives individuals into action.

Each individual has basic needs, and to gratify these needs, they activate them. The basic physiological needs are those of food, water, sleep, and sex. Mental or social needs include fame, cognition, affection, security, adequacy, social approval, etc. Needs are something people have to fulfil; they are basic and quite often instinctive.
- Drives are the mental tension that arises due to the need. They make individuals keep going. They are more individual in the sense that some people are more driven than others.
- Motives, however, indicate why people do what they do. Motives are factors within a human being that arouse and direct goal-oriented behaviour.

Abraham Maslow conceptualized personality in terms of a pyramid-shaped hierarchy of motives called the *hierarchy of needs* [2]. At the base of the pyramid are the lowest-level motivations, including hunger and thirst, safety and belongingness. Maslow argued that only when people can meet their lower-level needs are they then able to move on to achieve the higher-level needs of self-esteem, and eventually self-actualization, which is the motivation to develop our innate potential to the fullest possible extent.

Recent theories express criticism concerning Maslow’s assumption that the lower needs must be satisfied before a person can achieve their potential and self-actualize. This is not always the case, and therefore Maslow’s hierarchy of needs in some aspects has been criticized [2] (See Figure 1).

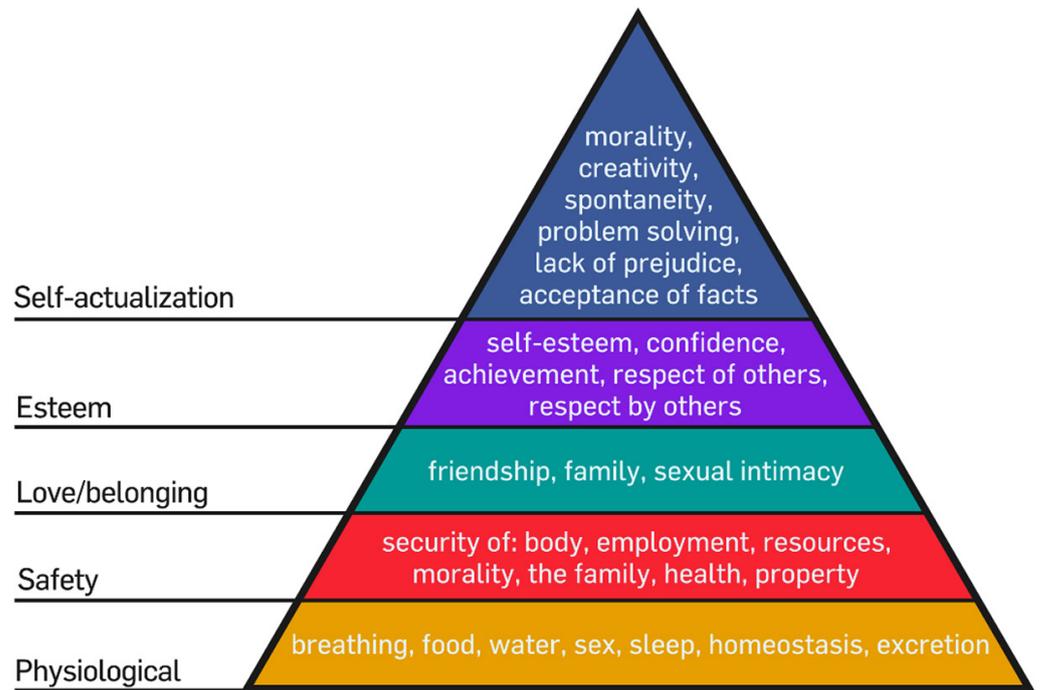


Fig. 1. Maslow's hierarchy of needs [2]

2.2 Intrinsic and extrinsic motivation

The two main types of motivation are frequently described as being either *extrinsic* or *intrinsic*: extrinsic motivation arises from outside of the individual and often involves external rewards, such as money, social recognition, praise, power, or money. Intrinsic motivation is internal and arises from within the individual, such as solving a problem or gaining knowledge (See Figure 2). Understanding a person's motivation can increase efficiency in working towards goals, encourage a drive to take action, help one feel more in control of their life, or improve overall well-being and happiness [1–2].

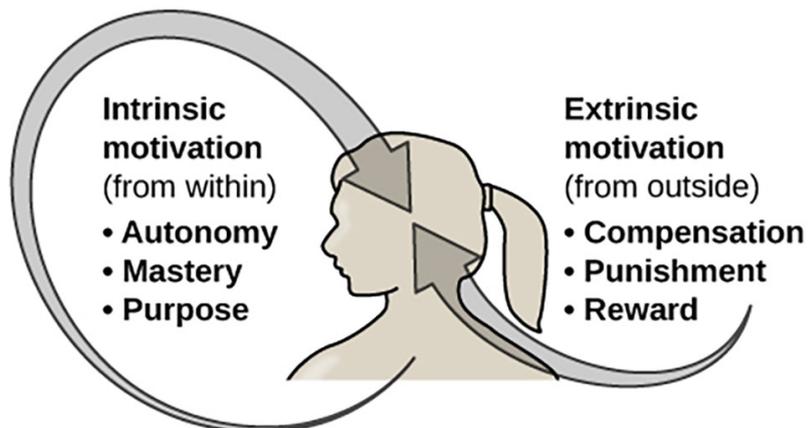


Fig. 2. Intrinsic and extrinsic motivation [3]

References [2] and [3] have identified three major components of motivation: activation, persistence, and intensity. Activation is the decision to initiate a behaviour.

Persistence is the continued effort toward a goal, even though obstacles may exist. Intensity is the concentration and vigour that goes into pursuing a goal.

2.3 Motivation in learning

Motivation is a so-called prerequisite to learning, and it has long been of interest among many educational researchers as an essential ingredient in effective teaching and learning. Several studies have suggested that various factors motivate students to learn, one of which is the role of teachers [3]. Literature on learning and motivation reveals the ways in which teachers can increase the students' motivation to learn [4], [5], [6]. Even when students may have an internal desire to learn, the external support provided by a teacher significantly impacts student learning [3], [13]. The teacher's role in motivation includes, but is not limited to, creating an environment conducive to learning and encouraging support of student autonomy [19]. The relevance and relatedness of the material increase the motivation to learn, too [14]. Additionally, the teacher's ability to develop student competence, interest in the subject taught, and perception of self-efficacy are all important factors that influence the students' motivation to learn. However, student learning may be affected by external factors such as rewards or incentives. Student learning is not entirely dependent on their own motivation, as teachers also play a vital role in increasing student learning through motivational support [3].

According to [3], the characteristics of intrinsic and extrinsic motivation in learning are: an individual is intrinsically motivated to do the activity because it is internally rewarding, fun, enjoyable, and satisfying (see Table 1). The goal comes from within, and the outcomes of the goal satisfy basic psychological needs for autonomy, competence, and relatedness. On the contrary, an individual is extrinsically motivated to do the activity to gain an external reward in return. The goal is focused on an outcome and does not satisfy basic psychological needs. Rather, it involves external gains, such as money, fame, power, or avoiding consequences.

Table 1. Examples of student intrinsic and extrinsic motivation in learning

| Intrinsic Motivation | Extrinsic Motivation |
|-------------------------------|-----------------------|
| Curiosity | Praise |
| Competence motivation | Good grades |
| Learning/exploring motivation | Degree |
| Attitude motivation | Peer appreciation |
| Creative motivation | Teacher encouragement |

In summary, student learning is influenced by motivation, and much is dependent on the teachers' involvement. Sometimes, the students' energy, drive, and enthusiasm for a subject or task may wane and therefore require continued reinforcement through external support to sustain it. To this end, teachers are responsible for creating a supportive environment that facilitates and increases student learning, and they often provide this external support. The teachers' role in facilitating student motivation is perceived through their support for developing student autonomy, relevance, relatedness, and competence. Teachers' interests and efficacy in teaching their subject may encourage motivation too.

In education, motivation helps students to focus their attention on a key goal or outcome. In doing so, they are unfazed by possible distractions and are therefore able to maintain their attention during longer periods of time. Students who are motivated display goal-oriented behaviours. They take initiative, show resilience, harness their curiosity, and care for and respect their work. They are equipped to orchestrate their own learning journey. Motivated students are inclined to want to learn and be more willing to accept the challenges that may come with the learning process. If students want to learn, then they are more likely to work hard in class, study and complete homework at home, have a desire to fix mistakes, and potentially even motivate or spark the interest of their peers. Motivation comes with many benefits, including increases in effort, energy, persistence, and creativity, enhanced cognitive processing, better school attendance, and the overall betterment of a student's well-being.

G. Petty [3] suggests several student motivators for wanting to learn (Petty, p. 61).

- What I am learning is useful to me.
- The qualification for which I am studying is useful to me.
- I find that my learning is usually successful, and this success increases my self-belief as a learner.
- I get the acceptance and appreciation of my teacher, and/or my peers, if I learn effectively.
- I expect that the consequences of not learning will be unpleasant (and fairly immediate).
- What I am learning is interesting and appeals to my curiosity.
- I find that learning activities are fun.

2.4 Demotivation

Demotivation is an area that has not been extensively researched and no specific framework has emerged from the studies done [15]. Demotivation is concerned with the negative forces or *demotives* that influence students' learning experience. Resource [8] defines demotivation as an external force that reduces or diminishes the motivational basis of a behavioural intention or an ongoing action.

To help students engage with their learning, schools and teaching staff should promote the students' learning motivation as well as reduce their demotivation. Past studies have focused mainly on investigating factors that affect student motivation or exploring ways to improve it. However, what has been overlooked is the exploration of factors that affect the opposite side of motivation, namely demotivation. As shown by [11], a restrictive learning environment, discouraging attitudes, and discouraging teaching approaches are factors that often lead to the students' demotivation.

Motivation can go both ways: motivation and demotivation are inextricably connected. Learners usually come motivated to learn, and the point is to not demotivate them. In many cases, not demotivating learners is an excellent way to support motivation. We can act to establish or reinforce the value of goals, we can help build positive expectations, and we can definitely create an environment that supports motivation. Students are demotivated by the structure and allocation of rewards. The structure and allocation of rewards in a course can encourage or discourage efforts in several important ways.

G. Petty [3] has also pointed to psychological student demotivators. Emotional factors such as depression or anxiety due to previous failure can demotivate. So can environmental and physiological factors such as cold, noise, hunger, etc. It is also possible to be over-motivated. If students are anxious about examinations, for example, they can overwork and tire themselves, or become so anxious that their efficiency falls. Generally speaking, a demotivated learner is someone who was once motivated but has lost his or her interest for some reason. In this vein, we can speak of demotives, which are the negative counterparts of motives [8].

While a motive can be said to increase an action tendency, a demotive decreases it. However, it is not necessary to tack the label demotivation or demotive onto every type of negative influence. References [9] and [10] identify three negative factors that might not be considered demotivation:

- An attractive alternative action that serves as a powerful distraction.
- The gradual loss of interest in a long-lasting, ongoing activity.
- The sudden realization that the costs of pursuing a goal are too high (e.g., when someone recognizes how demanding it is to attend a prestigious yet difficult school).

Demotivation concerns specific forces that reduce or diminish the motivational basis of a behavioural intention or an ongoing action [16]. The top three demotivating factors in learning are teachers lecturing too much, students having difficulty accomplishing classwork, and learning activities not being stimulating enough to hold their attention and moderately demotivating them in their learning. Teachers play an essential role in motivating or demotivating students in learning [5], [18].

3 RESEARCH DESCRIPTION

3.1 Research objective, research questions

As shown in the introductory part of our text, research suggests that the students' motivation to learn is influenced by both internal and external factors [4], [10]. Some students may be internally motivated to learn because of their curiosity and willingness to learn new things [9]. Others may be motivated by external factors such as teacher enthusiasm, teaching approaches, or the need to achieve a qualification. Internal and external factors may be interconnected.

The aim of our research was to get a deeper insight into the attitudes of students towards their motivation for studies and following research questions served as the framework:

RQ1: What motivates the students to learn?

RQ2: What demotivates the students to learn?

RQ3: What is the motivating/demotivating role of teachers, learning material and classes?

We focused particularly on the identification of demotivators – potential risks – for motivation as perceived by students of secondary technical schools. We hypothesized that teachers might considerably strengthen student intrinsic motivation if classes are perceived as useful, interesting, and inspiring.

3.2 Research methods and research sample

We chose a questionnaire as our main research method, as it offers a fast and efficient means of gathering large amounts of information from sizeable sample volumes. This tool is particularly effective for measuring subject preferences, intentions, attitudes, and opinions [7].

We addressed more than 200 secondary technical schools from a public database – these schools offer a variety of technical study programs – and we asked their management for permission to send a questionnaire to their students. Our primary objective was to analyse the topic through the attitudes of students with a technical education background. Most school directors confirmed our request, some refused it, and some did not respond. We received 749 responses but eliminated some of them (several schools, for example, also offer non-technical study programs and it might have been difficult to filter the student’s answers). After this elimination, our research sample included 665 responses. Responses were collected between November and December 2022.

3.3 Questionnaire design and administration

The designed questionnaire included general instructions, personal information, and the questionnaire itself. In the introductory part, a short paragraph informed potential respondents about the research organizer and the goal of the survey (as suggested by [7]). Personal information aimed at gender, year of study, specialization (13 offered categories), and geographical information on school location (5 offered categories).

The body of the questionnaire included items asking students to assess 8 model situations of negative factors (revised according to [3]), which represented risks in motivation (when some student needs were not satisfied) (see Table 2).

Table 2. Risk factors for study motivation

| Student Needs | Positive Motive/Motivator | Risk Factor/Demotivator |
|---------------------|---|---|
| Need for cognition | The new things I learn are useful to me. | The study materials are not useful to me. |
| Need for cognition | The new things I learn are interesting and motivating. | The new things I learn are boring and uninspiring. |
| Need for cognition | Classes are good and enjoyable. | Classes are not attractive; teaching is too routine. |
| Social needs | I perform well and I am more confident in class. | Poor grading makes me feel insecure in class. |
| Social needs | To gain the parents’ appreciation. | My parents are not interested in my school performance. |
| Social needs | My peers would appreciate it if I performed well. | My peers are not interested in my school performance. |
| Need of achievement | The qualification I’ll get is worthwhile for my future. | School results will not guarantee a good job/wealth. |
| Need of achievement | If I do not do my homework, I will get in trouble. | My teacher won’t find out if I do no homework. |

The items in the questionnaire including personalised questions were implemented into electronic form via forms.google. Then the questionnaire was sent as an e-mail message.

3.4 Data analysis

The Fuller method of paired comparison was used for our data analysis. This method is suitable for multiple criteria analysis, as the specification of weights for selected criteria and 3–9 variants for determining the weight of all criteria can be assessed. In our research, we used a modified Fuller’s triangle method (see Figure 3).



Fig. 3. Fuller’s triangle to compare 8 variants of responses

Data evaluation was made for all categories of respondents, and statistical differences in perceiving risk phenomena were compared among all groups of students.

4 RESEARCH RESULTS

4.1 Characteristics of survey respondents

Gender distribution of respondents (see Table 3).

Table 3. Gender distribution

| Gender | Male % | Female % | Other % |
|--------|--------|----------|---------|
| | 73 | 23 | 4 |

In our research sample, male students presumably outnumbered females due to the technical specialisation of the secondary schools researched and to the tendency for technical fields to be male dominated. But a detailed analysis shows that male students dominated only in engineering, electrical, and IT specialisations. There was almost equal representation of male and female students in construction and chemical study programmes, and females outnumbered males in textile and art industrial study programmes. Most respondents were from electrotechnical, electromechanical, and IT programmes; a few respondents were students of chemical, transportation, textile, and agriculture programmes (a few schools specialise in these study programmes).

Distribution of the respondents by the year of study (see Table 4).

Table 4. Year of study

| Year of Study | 1 | 2 | 3 | 4 |
|---------------|-----|-----|-----|-----|
| Students | 213 | 174 | 141 | 137 |
| % | 31 | 25 | 24 | 20 |

An approximately even distribution was gained from the data, representing all 4 years of study. Most respondents were students in the first year of secondary technical school, and their number decreased slightly year by year.

Gender distribution of respondents by study program (see Table 5).

Table 5. Gender distribution by study program

| Study Program | Male | Female | Other |
|-------------------------------------|------|--------|-------|
| Art in Industry | 12 | 42 | 4 |
| Engineering Construction | 48 | 8 | 3 |
| Technical Lyceum, Vocational School | 42 | 18 | 2 |
| Chemistry | 6 | 7 | 1 |
| Electrotechnical, Electromechanical | 224 | 13 | 7 |
| Construction, Geodesy | 25 | 25 | 2 |
| Agriculture | 8 | 4 | 0 |
| Textile Industry | 0 | 12 | 0 |
| IT | 125 | 19 | 7 |
| Transportation | 1 | 0 | 0 |

Characteristics of respondents by school location.

Table 6. School location

| School Location | Number of Students | % |
|-------------------------------|--------------------|------|
| 1–2,000 inhabitants | 14 | 2.1 |
| 2,001–10,000 inhabitants | 98 | 14.7 |
| 10,001–50,000 inhabitants | 100 | 15.0 |
| 50,001–100,000 inhabitants | 215 | 32.3 |
| More than 100,000 inhabitants | 238 | 35.8 |

Most students study in towns where the population exceeds 50,000 inhabitants. A few schools are located in small or rural districts (smaller towns generally offer study programmes specialising in agriculture, forestry, or transportation) (see Table 6).

4.2 Demotivators in learning as perceived by students

Risk analysis of motivation decrease and gender (see Table 7). As seen in the risk summary below and in Table 7, there are no significant differences in viewing

risks for teaching and learning motivation when we compared groups of respondents according to gender. Both of the dominant groups (boys and girls) believed that the main threats in the situations were when the teaching was not attractive or was routine/boring (Risk 1) and the study materials were unrealistic and lacked practical application. Both groups were convinced that multiple poor grades had a detrimental effect on student self-confidence. Motivational risks were dominantly related to cognitive needs and their frustration.

- Demotivator (Risk) 1 – The study materials are outdated and not applicable.
- Demotivator (Risk) 2 – The qualification I will get will not guarantee a qualified and well-paid position.
- Demotivator (Risk) 3 – Multiple poor grades decrease the self-confidence of the students.
- Demotivator (Risk) 4 – My parents do not show an interest in my school results and knowledge.
- Demotivator (Risk) 5 – My schoolmates and friends are not interested in my school results and knowledge.
- Demotivator (Risk) 6 – My teacher does not recognize that I am not prepared for class.
- Demotivator (Risk) 7 – The topics of our lessons are not interesting, and I do not think about the issues.
- Demotivator (Risk) 8 – The lessons are not attractive or they are boring.

Table 7. Risks in decreasing motivation and gender

| Gender | Risk 1 | Risk 2 | Risk 3 | Risk 4 | Risk 5 | Risk 6 | Risk 7 | Risk 8 |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Female | 532 | 482 | 674 | 307 | 403 | 431 | 620 | 751 |
| Male | 2,031 | 1,572 | 2,018 | 971 | 1,521 | 1,491 | 1,754 | 2,278 |
| Other | 110 | 102 | 128 | 77 | 86 | 97 | 79 | 105 |
| Total | 2,673 | 2,156 | 2,820 | 1,355 | 2,010 | 2,019 | 2,453 | 3,134 |

Risk analysis of motivation decrease and the year of study. When we compare risk analysis between the groups of respondents according to the year of study, there just are minor differences, as seen in Table 8.

Table 8. Risk in decreasing motivation and the year of study

| Year of Study | Risk 1 | Risk 2 | Risk 3 | Risk 4 | Risk 5 | Risk 6 | Risk 7 | Risk 8 |
|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 1 | 869 | 699 | 927 | 466 | 672 | 595 | 696 | 900 |
| 2 | 680 | 535 | 755 | 304 | 544 | 479 | 627 | 808 |
| 3 | 594 | 497 | 589 | 329 | 442 | 535 | 611 | 771 |
| 4 | 530 | 425 | 549 | 256 | 352 | 410 | 519 | 655 |
| Total | 2,673 | 2,156 | 2,820 | 1,355 | 2,010 | 2,019 | 2,453 | 3,134 |

While the students in the first school year consider Risk 3 (*Multiple poor grades decreases my self-confidence*) to be the most important to them, the opinions of students in the following school years are dominated by demotivators 1, 7, and 8 (*The study materials are outdated and not applicable, The topics of our lessons are not interesting and I do not*

think about the issue, The lessons are not attractive or they are boring). These results might be explained by the fact that data were collected in December 2022, when the freshmen (mostly 15 years old) were still sensitive to the teacher performance evaluation from the previous school. Older classmates might seem more critical of teacher performance and the quality of study material. Their needs for cognition are not met at this stage of psychological development and their frustration can lead to lower study motivation.

Risk analysis of motivation decrease and the study program (see Table 9).

Table 9. Risk in decreasing motivation and the study program

| Study Program | Risk 1 | Risk 2 | Risk 3 | Risk 4 | Risk 5 | Risk 6 | Risk 7 | Risk 8 |
|-------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Transportation | 11 | 10 | 9 | 13 | 8 | 10 | 12 | 11 |
| Electrotechnical, Electromechanical | 993 | 740 | 1009 | 523 | 771 | 763 | 850 | 1100 |
| Chemistry, Chemical Technology | 57 | 43 | 67 | 40 | 42 | 29 | 53 | 61 |
| Construction, Geodesy, Cartography | 202 | 151 | 229 | 114 | 139 | 148 | 213 | 260 |
| Engineering, Construction | 266 | 227 | 273 | 114 | 165 | 164 | 191 | 252 |
| Technical Lyceum, Vocational School | 266 | 226 | 252 | 139 | 181 | 179 | 216 | 270 |
| Information Technology | 588 | 457 | 615 | 246 | 470 | 480 | 593 | 779 |
| Textile Industry | 47 | 46 | 59 | 21 | 21 | 34 | 48 | 60 |
| Art in Industry | 193 | 220 | 246 | 107 | 166 | 170 | 244 | 306 |
| Agriculture and Forestry | 50 | 36 | 55 | 38 | 47 | 42 | 33 | 35 |
| Total | 2,673 | 2,156 | 2,820 | 1,355 | 2,010 | 2,019 | 2,453 | 3,134 |

Dominant demotivators and situations leading to motivation decrease. Answers of students from various schools and study programs indicated major motivation risks for their study (see Table 10): Risk 1 (*The study materials are outdated and not applicable*), Risk 7 (*The topics of our lessons are not interesting, and I do not think about the issues*), and Risk 8 (*The lessons are not attractive or they are boring*) referred to the prevalent cognitive need frustration, as well as Risk 3 (*Multiple poor grades decrease the self-confidence of the students*). But none of the risks seems dominant in the students' responses.

Table 10. Dominant demotivators as shown in our research results

| Situations Leading to Motivation Decrease | Risk | Answers |
|---|--------|---------|
| The lessons are not attractive or they are boring. | Risk 8 | 3,134 |
| Multiple poor grades decrease the self-confidence of the students. | Risk 3 | 2,820 |
| The study materials are outdated and not applicable. | Risk 1 | 2,673 |
| The topics of our lessons are not interesting, and I do not think about the issues. | Risk 7 | 2,453 |
| The qualification I will get will not guarantee a qualified and well-paid position. | Risk 2 | 2,156 |
| My teacher does not recognize that I am not prepared for class. | Risk 6 | 2,019 |
| My schoolmates and friends are not interested in my school results and knowledge. | Risk 5 | 2,010 |
| My parents do not show an interest in my school results and knowledge. | Risk 4 | 1,355 |

5 CONCLUSIONS

Our research results confirmed demotivation in learning considerably reduces or diminishes the positive basis of a behavioural intention or an ongoing action of students and teachers play an essential role in motivating or demotivating students in learning.

No significant differences in viewing demotives for learning were found when we compared groups of respondents from secondary technical schools according to gender, year of study and the study program. Quality of study material, class environment and teacher performance (representing needs for cognition), student self-confidence, peer and parent appreciation (representing social needs) and value of future employment and school assessment (representing needs of achievement) were all noted by most respondents as crucial demotives in learning technical subjects.

6 ACKNOWLEDGMENT

The authors would express special thanks to Ing. J. Janků for help with data collection.

7 REFERENCES

- [1] J. S. Nevid, *Psychology: Concepts and Applications*. 4th edition. University of Massachusetts Boston, MA: Wadsworth Cengage Learning, 2013.
- [2] S. A. Nolan and S. E. Hockenbury, *Discovering Psychology*. 9th edition. New York: Worth Publishers, 2021.
- [3] G. Petty, *Teaching Today: A Practical Guide*. 4th edition. Cheltenham: Nelson Thornes Ltd, 2009.
- [4] K. Bain, *What the Best College Teachers Do*. Cambridge, MA: Harvard University Press, 2004.
- [5] S. Park, "Motivation theories and instructional design," in *Foundations of Learning and Instructional Design Technology: The Past, Present, and Future of Learning and Instructional Design Technology*, Tempe, AR. EdTech Books, 2018. Retrieved from https://edtechbooks.org/lidtfoundations/motivation_theories_and_instructional_design
- [6] D. Johnson, "The role of teachers in motivating students to learn," *BU Journal of Graduate Studies in Education*, vol. 9, no. 1, pp. 46–49, 2017.
- [7] C. Minto, G. B. Vriza, M. Martinato, and D. Gregori, "Electronic questionnaires design and implementation," *Open Nursing Journal*, vol. 11, no. 1, pp. 157–202, 2017. <https://doi.org/10.2174/1874434601711010157>
- [8] Z. Dornyei, *Teaching and Researching Motivation*. London: Longman, 2001.
- [9] R. M. Ryan and E. L. Deci, "Intrinsic and extrinsic motivations: Classic definitions and new directions," *Contemporary Educational Psychology*, vol. 25, no. 1, pp. 54–67, 2000. <https://doi.org/10.1006/ceps.1999.1020>
- [10] U. Schiefele and E. Schaffner, "Teacher interests, mastery goals, and self-efficacy as predictors of instructional practices and student motivation," *Contemporary Educational Psychology*, vol. 42, pp. 159–171, 2015. <https://doi.org/10.1016/j.cedpsych.2015.06.005>
- [11] P. Singh and M. P. Singh, "The role of teachers in motivating students to learn," *TechnoLEARN: An International Journal of Educational Technology TechnoLEARN*, vol. 11, no. 1, pp. 29–32, 2021. <https://doi.org/10.30954/2231-4105.01.2021.6>

- [12] Z. Svobodová, J. Veteška, and D. Dvořáková, "Virtual co-teaching through the eyes of primary and secondary school students," in *Co-Teaching: Everyday Life or Terra Incognita of Contemporary Education?* B. Pitula and M. Kowalski, Eds. Göttingen: V&R unipress, 2022, pp. 125–143. <https://doi.org/10.14220/9783737015004.125>
- [13] M. Takase, M. Niitani, T. Imai, and M. Okada, "Students' perceptions of teaching factors that demotivate their learning in lectures and laboratory-based skills practice," *International Journal of Nursing Sciences*, vol. 6, no. 4, pp. 414–420, 2019. <https://doi.org/10.1016/j.ijnss.2019.08.001>
- [14] M. A. Theobald, *Increasing Student Motivation: Strategies for Middle and High School Teachers*. Thousand Oaks, CA: Corwin Press, 2006.
- [15] C. V. Ahmad, "What makes our students demotivated in learning?" *Indonesian Journal of Educational Research and Technology*, vol. 1, no. 2, pp. 51–56, 2021. <https://doi.org/10.17509/ijert.v1i2.33409>
- [16] F. H. Albalawi and A. H. Al-Hoorie, "From demotivation to remotivation: A mixed-methods investigation," *SAGE Open*, vol. 11, no. 3, 2021. <https://doi.org/10.1177/21582440211041101>
- [17] D. A. Cook and A. R. Artino, "Motivation to learn: An overview of contemporary theories," *Medical Education*, vol. 50, no. 10, pp. 997–1014, 2016. <https://doi.org/10.1111/medu.13074>
- [18] R. Marouf, "Examining trajectories of teacher motivation in correlation with students' perceptions in computer science: Toward sustainable motivation to teach," *International Journal of Engineering Pedagogy (IJEP)*, vol. 13, no. 1, pp. 102–109, 2023. <https://doi.org/10.3991/ijep.v13i1.36829>
- [19] T. Rüttemann and H. Kipper, "Klagenfurt school of engineering pedagogy by Adolf Melezinek as the basis of teaching engineering," *International Journal of Engineering Pedagogy (IJEP)*, vol. 6, no. 3, pp. 10–18, 2016. <https://doi.org/10.3991/ijep.v6i3.5949>

8 AUTHORS

Dana Dobrovská is an associate professor of psychology at the Masaryk Institute of Advanced Studies, Czech Technical University in Prague, former president of the International Monitoring Committee IGIP. In her research, she specialised in technical teacher education, student academic cheating, virtual and augmented reality in education and motivation in learning.

David Vaněček is an associate professor of teaching methodologies at the Masaryk Institute of Advanced Studies, Czech Technical University in Prague. He is currently deputy director of the Masaryk Institute of Advanced Studies and head of the Institute of Pedagogical and Psychological Studies. In his research, he specialised in technical teacher education, artificial intelligence (IA) in education, teaching methodologies, virtual and augmented reality and motivation (E-mail: david.vanecek@cvut.cz).