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Relationship Between Classroom Management Strategy Focused on Student External Behaviour and Student Achievement in Low SES Schools: What Can Teachers Do?

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Abstract

Various international studies record a significant difference between the achievements of students from different socioeconomic status (SES), so it is necessary to look for measures that help create favorable conditions for higher achievements of all students, regardless of their socioeconomic background. The purpose of this study is to clarify the relationship between classroom management strategies focused on student external behaviour and student achievement in low SES schools, and what the teacher's work guidelines could be. The analysis of the learning data of four Lithuanian schools with an unfavourable SES context shows that the progress of students in subjects of mathematics and biology is not related to the teacher's praise, although such an intervention tool can be used if it is characterized by individual attention and care. It was also found that as the number of remarks sent by the mathematics teacher to the student and/or parents increases, the probability of getting a lower math grade increases, meaning that remarks are not effective for higher student achievement. We dare say that in order to create a favourable learning environment for students from low SES, teachers must first try to avoid classroom management problems (that is, student misbehaviour) by building good relationships with students, choosing an appropriate teaching strategy, adopting a growth mindset, and reducing working memory demands for the students who have these difficulties. Also, teachers must react appropriately when there are problems with students' behaviour. Interpersonal communication with students, individual attention to their needs are extremely important ways for teachers who work in schools with unfavourable SES contexts.

Keywords: classroom management, student external behaviour, student achievement, low SES schools, remark, praise.

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1. Introduction

Inequality in education is one of the main topics of educational research looking for answers to whether all students are provided with the right conditions for their higher achievements. There is a noticeable increase in the high- and low- socioeconomic environment (hereinafter – SES) students achievement gap for both mathematics and science between 2003 and 2015 (Broer et al, 2019) and 2019 the tendency of the research results remains the same. The socioeconomic status (SES) of students and their families has long been associated with the success at school (Hair et al., 2015; Lawsona, Farah, 2017). Research findings show that achievement gaps begin to emerge at an early age (Cloney et al., 2016), and that children from low SES families receive lower grades, perform worse on achievement tests, and achieve lower educational attainment on average than their peers from high SES families (Albert et al., 2020).

According to researchers (Jotterand, 2018; Lipina, Evers, 2017), there is a large list of protective and risk factors associated with the future cognitive, emotional and social achievements of children from low SES and based on developmental psychology and cognitive neuroscience research. These factors are of a very diverse nature, including individual factors of the mother (prenatal maternal health, mental health of parents), individual factors of the child (perinatal health, development disorders), family-level factors (quality of early attachment, level of stress at home, quality of parenting, early cognitive and learning stimulation at home, financial stressors on the family, lack of social mobility, family expectations about child development) and even systemic factors (access to health and social services, social and political stress). In the case of our study, it is important to identify factors that can be associated with the school level. The aforementioned researchers (Jotterand, 2018; Lipina Evers, 2017) indicate the level of stress in school, mental health of teachers, early cognitive and learning stimulation at educational contexts and social and cultural expectations about child development as protective or risk factors for low achievement of students from low SES.

Agirdag (2018) argues that the culture of learning in schools is indeed related to the SES composition of students. In other words, teachers' beliefs are related to the social and economic context of the school in which they work. It appears that teachers tend to believe more that their students are more teachable when they teach students from high SES than from low SES. According to this scientist (Agirdag, 2018), such research results are worrying because there are no objective reasons why students in a school where more socioeconomically disadvantaged children should be regarded as less teachable. Other researchers (Timmermans et al., 2016) point out that students from low SES schools may have different work habits and this affects teachers' beliefs and expectations. Teachers have higher expectations of students if they are self-confident and have good working (learning) habits.

Students' learning habits are very closely related to classroom management strategies as well. Effective classroom management involves ensuring active learning time for students by setting classroom rules and responding to students' misbehaviour accordingly. Many studies show that classroom management is one of the most significant factors influencing students' achievement (Müllera et al., 2018). Students' talking during lessons, throwing things or walking around the classroom at inappropriate times disrupts the learning process and are associated with low achievement or behaviour problems (Blank, Shavit, 2016; Le Blanc et al., 2007; Little, 2005). According to Wubells (2011), theoretically we can see six different approaches to classroom management: focused on external behaviour control, internal control, classroom ecology, discourse, curriculum and interpersonal relations. In this study, we focus on the control of the student's external behaviour, so now we will briefly present these main theoretical aspects.

The behavioral approach is perhaps the oldest research-based approach to classroom management (Landrum, Kauffmann, 2006). This theoretical approach can be linked to behaviourist principles of learning, where it is believed that positive reinforcement through the application of a stimulus (or reward) following a desired behaviour will reinforce the desired behaviour of the student. For example, teachers give praise to children when they behave well or complete certain tasks. Also, teachers, guided by this theory, can remove the (usually negatively experienced) stimulus in exchange for the desired behaviour of the student (do not assign homework if students complete assignments on time in class), ignore inappropriate student's behaviour, or apply certain punishment measures (recognizing that this is an extreme measure). According to

Brophy (2006), today teachers usually choose ways to increase desirable and decrease undesirable behaviour, that is, they apply certain credit systems, modeling, clear rules, praise and approval.

There is no unanimity in academic discourse regarding praise as an effective classroom management tool. On the one hand, Moore and co-authors (Moore et al., 2019) point out that there is currently insufficient evidence to classify teacher praise as an evidence-based practice, as no clear patterns have been identified as to when and why teacher praise can be effective. On the other hand, these researchers note that a meta-analysis of classroom management studies found that teacher praise was effective in nearly 70 percent of the 32 cases summarized in this review, and the average effect size suggests that teacher praise is an effective intervention. It turns out that teacher praise in certain cases is an effective measure and can increase appropriate student behaviour and engagement in the task (Haydon et al, 2020). Also, researchers (Caldarella et al., 2021) note that during adolescence, intervention measures (praise or remarks) in schools can be unsuccessful and due to the fact that they do not correspond to the increasing adolescents' desire to be respected, that is, to receive not public but rather individual, private encouragement.

When discussing separate groups of students, special attention is paid to the students with behavioural and emotional disorders, as their behaviour in the classroom usually presents challenges for teachers. Downs et al. (2019) study shows that students at risk of behavioural and emotional disorders are more sensitive to teacher praise or remarks than their peers. It has been observed that these students (with behavioral and emotional disorders) typically receive two to four times more remarks than praise (Haydon et al., 2020), even though remarks are ineffective (Caldarella et al., 2020). It appears that a 9:1 ratio of praise to remarks is needed to achieve similar levels of engagement in learning between students with behavioural and emotional disorders and their typical peers (Caldarella et al., 2019).

Summarizing the above mentioned arguments, it can be seen that the student-oriented classroom management strategy is not unambiguous and can be seen as controversial. However, Moore and co-authors (Moore et al., 2019) state that methodologically sound studies have not identified cases of negative effects of praise. Such research findings suggest that teachers can use praise as an easy-to-implement strategy for addressing student learning and behaviour problems in the classroom and recognizing that praise alone cannot be limited as a classroom management strategy. Thus, the problematic scientific question is whether there is a link between a relationship between classroom management strategies focused on student external behaviour and student achievement? This present study addresses this question and, based on data analytics, examines the relationship between classroom management strategies focused on student external behaviour and student achievement in low SES schools.

2. Methodology

The object of the study is the relationship between classroom management strategies and student achievement in low SES schools. In this study, the classroom management strategy focused on the student's external behaviour is operationalized as text messages written by the teacher, that is, praises and remarks on the student's learning or behaviour, and student progress is operationalized as the arithmetic mean of all grades obtained by the student in subjects of mathematics and biology. The subjects of mathematics and biology are chosen as disciplines of exact sciences that encourage the development of students' critical thinking and problem-solving skills.

Research ethics. The basic principles of research ethics were followed during the study. The researcher has already received depersonalized data from the electronic diary, that is, no individual data of a person (teacher, student or parent), i.e. names, surnames or other identifiers indicating the specific identity of a person were not provided to her. Prior to the study, unique numbers for each teacher, student, or parent were randomly generated in the database to identify the data.

The survey sample. Four secondary education schools were selected in three districts of Lithuania. Schools in these municipalities are classified as schools whose SES context is not very favourable. These are small schools, where about 40 % of students are from low-income households, receiving social support (free school meals). The selected students for the study where those who had grades in subjects of mathematics and biology in 2020–2021 (students who were in the system but did not receive grades were not included in the analysis). Thus, a total of

320 students in grades 7 to 10 were selected for the study in 4 schools. The distribution of students by school classes is presented in Table 1.

Table 1. The distribution of students by classes

Students' class	7	8	9	10
Number of students	90	97	70	63

The sample of research data. The information system of the electronic diaries of the 4 educational institutions selected for the study is managed by "ManoDienynas", therefore, based on this system, data covering the records of the 2020–2021 academic year of grades 7-10 was formed. The total amount of data is 548697 rows. Text messages written by mathematics and biology teachers to the students or their parents were also included in the data analysis. The message base included letters (only the subject of the letter is displayed), remarks/praises (the full text of the message is displayed, limited to 100 characters). In the data, information was provided in Lithuanian, a total of 6167 text messages.

Data analysis methods. In order to reveal the correlations of the classroom management strategy focused on the student's external behaviour with the students' progress in mathematics and biology, a simple (arithmetic) grade point average was calculated, including the assessments of class work, homework, project work, independent study and project work. The algorithm for setting the tone of text messages (compliments and remarks) was compiled in the following sequence:

1. The rows in the database were marked as text messages, and rows that were empty or did not match the research objective were filtered and removed (e.g., if the rows in the database provided did not contain text, the information was not related to the subject of the study, an email was provided but did not specify the subject of the email).

2. The compiled array of test messages is divided according to the words and phrases used by the teachers in a certain tone of the message:
- neutral (e.g. "control work", "distance learning", "free meals", "regarding wearing masks", "regarding the schedule");
- positive (praise);
- negative (remarks).

3. The author of the article compiled a dictionary of words with a certain semantic basis according to the pre-sorted tone of the array of text messages (for example, praises – "able", "worked", "is trying", "performed", remarks - "side activities", "does not listen", "does not perform").

4. The vector method based on Bag of words was used for the research. A single feature vector is created using all words in the dictionary. This feature vector is used to represent all the features in our collection. The number of characters is equal to the number of unique words in the dictionary. Each word becomes the meaning of the corresponding trait word (neutral = 0, positive = 1, negative = 2). If a word in the dictionary is not included in the pattern, it has a value of 0.

5. Each test message is converted into a vector with a set of attributes (1 word = 1 attribute).

6. A certain tone based on which words are more frequent in it is assigned to the message.

The accuracy of the developed algorithm in determining the mood of messages is equal to 81.59 percent. In order to clarify the relationship between the students' progress and the classroom management strategy focused on the student's external behaviour (praise, remarks), the Pearson correlation coefficient was calculated.

3. Results
General overview of all messages sent by teachers. The first aspect explored in the search for links between the classroom management strategy focused on student's external behaviour and students' achievement in low SES schools was a review of all reports to the student and/or his/her parents. The obtained research results are presented in Figure 1.
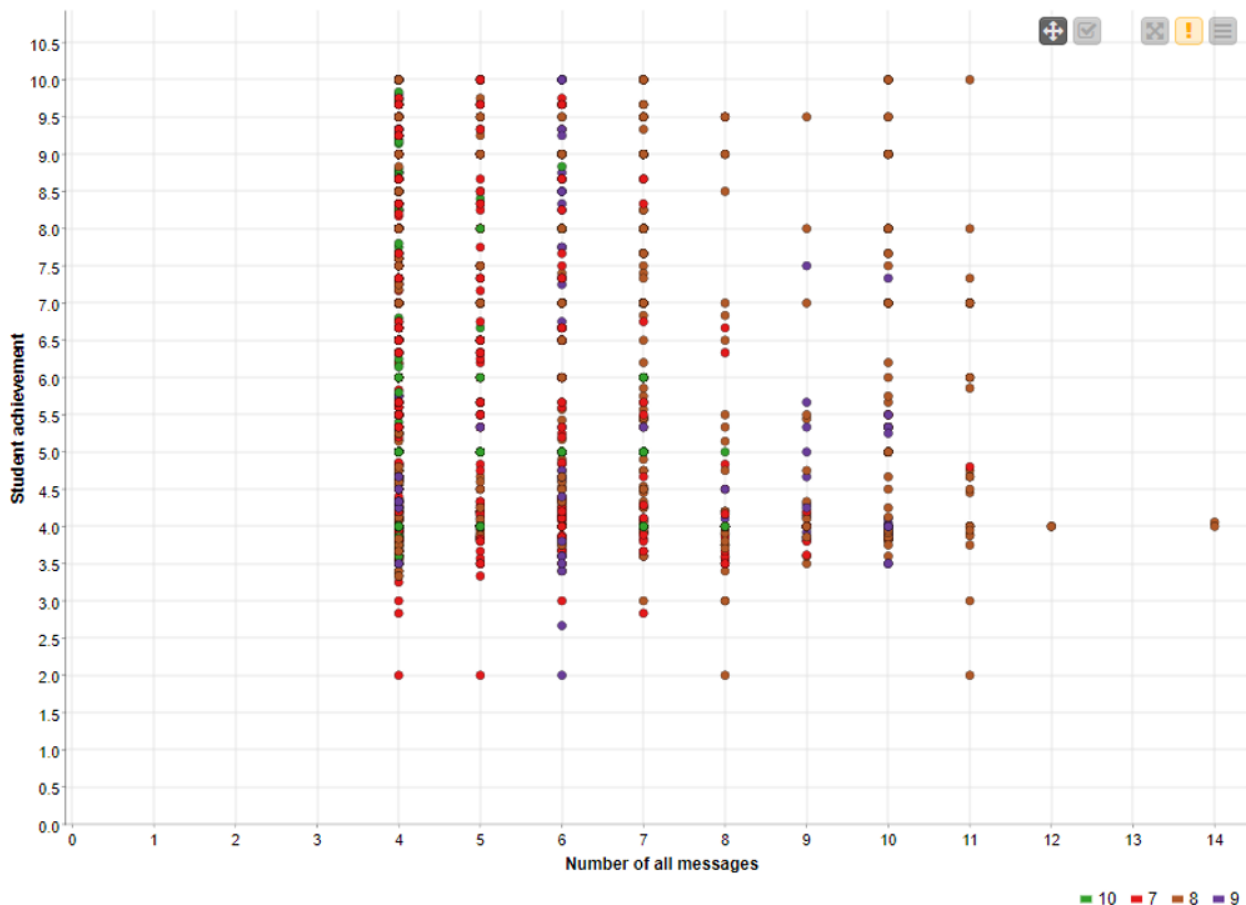
Fig. 1. Correlations between all messages sent by teachers and students' progress

The results of the study show that a larger proportion of 7-10th grade students received 4 to 7 messages per year, fewer students received 8 to 11 messages, and a few students received 12 or 14 messages. It is noticeable that students in the 7th and 10th grade received fewer messages, while their fellow students from the 8th and 9th grades received more. When assessing students' progress, it can be seen that the overall assessment of mathematics and biology is on a very wide scale, ranging from not advanced (2) to the highest (10). After conducting a correlation analysis of the number of all messages sent and the progress of students, it was found that the values of the correlation coefficient differed according to the subjects of mathematics and biology. The value of the correlation coefficient between the evaluation of the biology subject and the total number of messages is equal to 0.262, that is, the number of messages sent by the teacher to the parents or the student is weakly related to the progress of the students. In the aspect of mathematics subject, the value of the correlation coefficient is equal to 0.580, that is, this relationship is of moderate strength, which means that as the number of messages sent increases, the probability of students getting higher grades increases. It is necessary to pay attention to the fact that in both cases (biology and mathematics) all messages sent by the teacher (positive, neutral and negative) were counted. It was also established that 90 percent all messages consisted of messages sent by mathematics teachers and, accordingly, only 10 percent by biology teachers.

Associations between teacher-sent praise and students' achievement. Since teachers can encourage desirable behaviour and reduce undesirable behaviour by using praise, approval or remarks, the second aspect of the analysis was chosen to be messages with a positive tone, i.e., praise or encouragement. Examples of them are "Well done, she is doing great in studies, homework is always done and on time", "actively participates in classes", "makes an effort, completes tasks". The most common praises are related to classwork, independence, and effort. The relationships between praises and student achievement are shown in Figure 2.
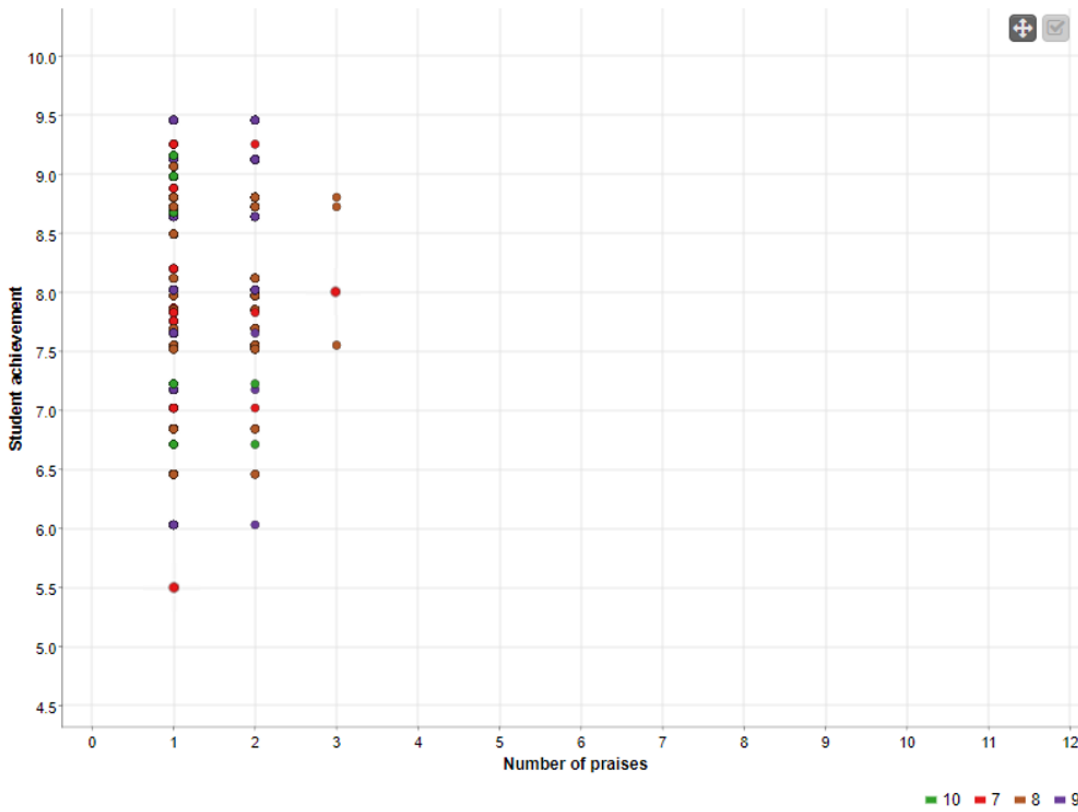
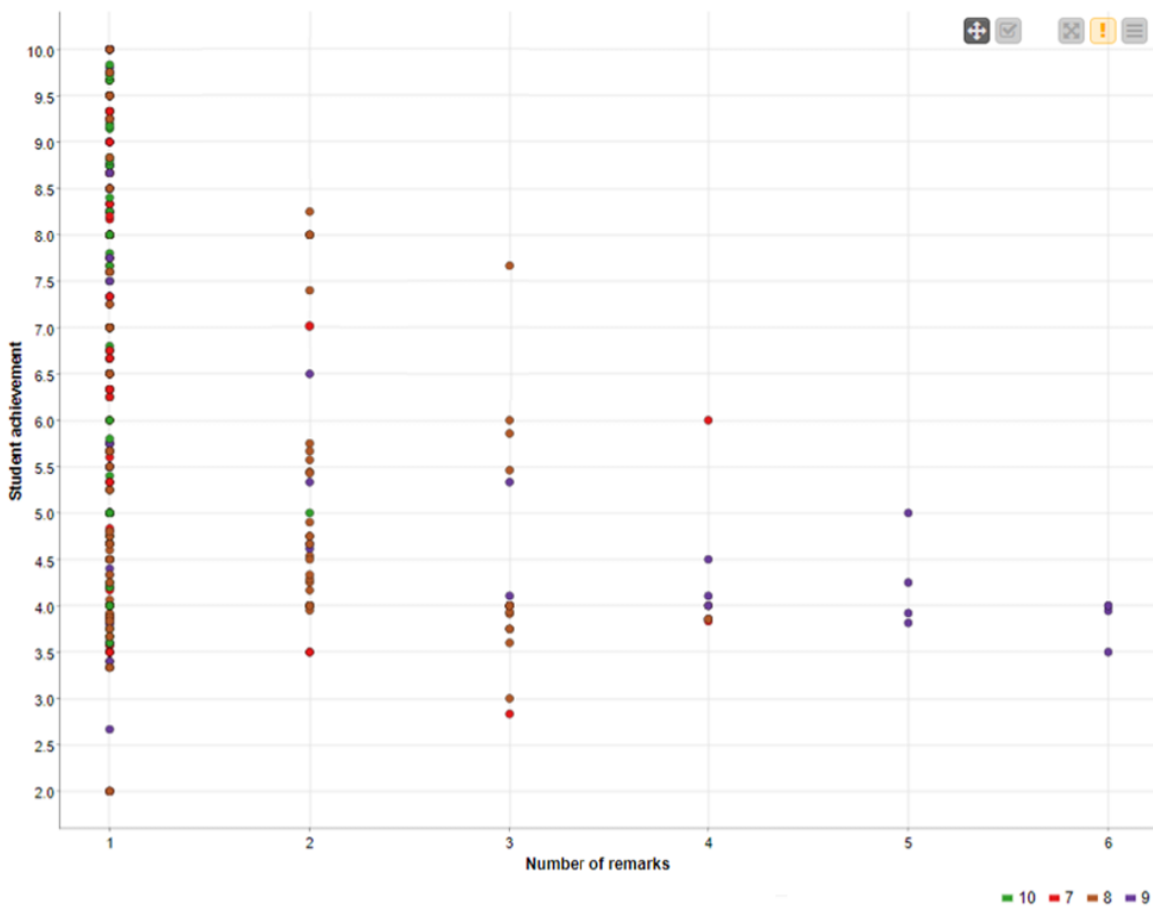**Fig. 2.** Associations between teacher-sent praise and student achievement

Fig. 3. Associations between teacher-sent remarks and students' achievement

As can be seen, teachers wrote praise or encouragement in the electronic diary from 1 to 3 times. More often, they were written for younger students (grades 7th-8th), while older students (grades 9th-10th) received them less or not at all. Students who received one or two praises, have mathematics and biology grades on a wide scale, ranging from 5.5 to 9.5. It should be emphasized that the students who received two praises each have no negative progress, while the four students who received 3 teacher praises each have a progress between 7.5 and 8.8. However, a correlational analysis of praise and student progress showed that there is no relationship between these variables. The value of the obtained correlation coefficient is equal to 0.067 (biology subject) and 0.132 (mathematics).

Associations between teacher-sent remarks and students' achievement. An in-depth analysis of the relationship between teachers' negative messages (remarks) in the electronic diary and students' progress was also carried out. The obtained research results are presented in Figure 3.

First of all, we would like to note that on the left side of the figure, it can be clearly seen a large proportion of students from different grades (from the youngest to the oldest) who have one note from the teacher in the electronic diary, however their progress in mathematics and biology covers almost the entire spectrum of evaluations: from the lowest, that is, negative, (2) to the highest (10). There is also a not so small group of students from different grades with two or three remarks each, whose progress is also in a wide range (from 2.8 to 8.3), but in this case the students do not have very high ratings (above 8.5) anymore. This tendency in learning outcomes is even more evident when looking at students with four, five or six remarks. Possible examples of remarks are "hardly participates in classes", "does not do homework", "does extracurricular activities", "makes noise, disturbs the whole class". The most common remarks are related to irresponsibility in performing assigned tasks, engaging in extraneous activities, and remarks regarding inappropriate behaviour. After conducting a correlational analysis of the data of all four schools, that is, the remarks written by the teachers in the electronic diary, and the student's progress, it was found that the coefficients of the correlation value differ according to the educational subjects. In the subject of biology, the correlation between remarks and student progress is weak (-0.207), and in the subject of mathematics it is stronger (-0.401). Hence, as the number of remarks sent by the mathematics teacher to the student and/or parent increases, the probability of receiving a lower math grade increases.

4. Discussion

The obtained research data allow us to say that the progress of students has no relationship with the student-centered classroom strategy. It was found that as the number of remarks sent by the mathematics teacher to the student and/or parent increases, the probability of receiving a lower math grade increases. Thus, remarks are not effective and likely do not motivate students to learn better, and there is also no correlation between teacher-written praise and student progress. Considering such research results, it is important to highlight several aspects.

First, in order to create a favourable learning environment for students from low SES, from our point of view, the teacher must first try to avoid classroom management problems (that is, students' undisciplined behaviour) by choosing the right teaching strategy. According to researchers (Clark et al., 2012), a decade of research has confirmed the need for direct, explicit teaching for low-achieving students who lack basic knowledge and skills. When teaching new curriculum and skills, teachers should use precise guidance, linking these students' learning practices with clear and precise feedback. According to Helmke (2012), leading the lesson in different ways and levels is a necessary condition for achieving the best learning outcomes without exhausting the students. The most important thing is that learning support is always offered according to the students' initial knowledge and abilities.

Second, when teaching low-SES students, teachers should adopt a growth mindset – the belief that students' abilities can be developed by encouraging and supporting their efforts. As stated in the introduction of this article, researchers (Agirdag, 2018) claim that there are no objective reasons why students in a school where more socioeconomically disadvantaged children study, should be regarded as less teachable. In line with our (Brandisauskiene et al., 2021) and other researchers' (Destin et al., 2019) research results, it can be seen that low SES students, when compared to their high SES peers, have less faith in their ability to develop and feel that as if their efforts were meaningless. However, these students will be more motivated to learn in school if they

perceive that their efforts can be accompanied by success (Browman et al., 2017). Therefore, we want to re-emphasize the importance of teacher expectations and appropriate behaviour when working with students from low SES: they need teacher support and academic support, belief in their abilities or mind-set interventions that can be effective (Sisk et al., 2018).

Third, teachers report that students who have discipline problems in class also show signs of working memory impairment (Alloway et al., 2012). This supports research findings that students' working memory difficulties affect not only academic achievement but also classroom functioning (Alloway et al., 2009). Consequently, in order to achieve high academic achievement, a student must concentrate and successfully complete a wide variety of structured learning tasks. However, if the students are unable to do this, they often fail in a variety of learning situations because they are unable to store and organize information in working memory, their learning progress will be slow, and their behaviour in the classroom will be problematic. As Alloway (2006) suggests, there is still no clear consensus on ways to improve working memory skills, but the learning progress of low SES students can be greatly improved by reducing working memory demands in the classroom. Given that students with poor working memory often fail to complete class activities simply because they forget what to do next, teachers can increase the likelihood of successful activity completion by frequently repeating clear, step-by-step instructions and asking students to repeat them out loud. Also, teachers can teach and encourage children to use certain memory aids, such as number lines, lists of words, formulas. It is especially important that these students are taught metacognitive strategies to cope with working memory failures, such as not being afraid to ask for forgotten information and to have confidence in their abilities even when they fail.

Fourth, the research results show that remarks are written more often for younger (7-9th grade) students. We would like to note that during this period students are teenagers and first of all it is necessary to build a good relationship with them in order to understand them. This should be the main attitude of teachers (and parents) to encourage adults to build a good relationship with them, listen respectfully and be listened to, as this is the only way to lay the foundation for their trust and openness.

Fifth, our research shows that praise is not effective because it has no bearing on student progress. There is also evidence in scientific literature to support this tendency. For example, Dweck (2017) points out that both favouring a person's personality and praising efforts do not affect achievement or have a negative effect, while Skipper, Douglas (2011) note that praise does not have a particularly unfavourable effect when one succeeds, but rather when one fails or there is an incomprehensible task. However, Sabey and colleagues (Sabey et al., 2018) argue that praise is effective when used strategically to achieve individualized student success. These researchers suggest that educators pay attention to how students respond to praise to ensure that this interaction has the intended effect. Haydon, Musti-Rao, Kennedy, Murphy, Hunter, and Boone (2020) suggest that when giving praise, the conditions for good praise should be met: link the praise to the student's behaviour that you want to reinforce, give it immediately after the student's appropriate behaviour, be close to the student to see all his/her subtle cues (e.g. a smile) and say a specific word of praise, drawing the student's attention, apply behavioural support consistently, predictably and provide informative feedback about the student's appropriate and specific behaviour, the success of learning activities. Praise can be one of the components of ongoing interaction between students and teachers if it is characterized by individual attention and care (Haydon et al., 2020).

Sixth, all the above mentioned activities of the teacher, related to both teacher's attitudes and teaching strategies, from our point of view, can create favourable conditions for learning. This should be the first and the most important goal of a teacher's work. The second goal is the appropriate teacher's reaction when there are already students' behavioural problems. If they are small, it is advisable for the teacher, who seeks to focus the attention of inattentive students, to simply be closer to these students, look them in the eyes, ask them to answer questions ("Martin, we solved this problem this way. How would you rate it?") or to name misbehaving students when presenting learning materials ("the next step in problem solving, Ann, is…"). In cases where misbehaviour is persistent or disrupts the teaching and learning process, the teacher must remind students of the rules and/or demand appropriate behaviour.

Finally, it is necessary to note that all actions of classroom management in educational practice must be selected taking into account the specific context and time. As stated by Wubells

(2011), in educational reality, in order to correct students' inappropriate behaviour, certain elements of various theoretical approaches (to the student's external behaviour, internal control, classroom ecology, discourse, curriculum and interpersonal relations) are usually integrated. According to the scientist, over the past three decades, a transition from behavioural classroom management methods to internal (ecological, curriculum, discourse-oriented and interpersonal) methods has been observed all over the world, therefore mutual communication with students, individual attention to their needs are extremely important methods of teacher's action.

We would also like to emphasize that the carried out analysis of learning data should be continued. Acknowledging the limitations of this study - only one out of six classroom management approaches was analysed, only written reports in the electronic diary were assessed, certain (distinct) groups of students were not taken into account (e.g. students with behavioural and emotional difficulties, and research shows that students from low SES are at risk for these disorders), it is clear that the field of research should be expanded. Classroom management is one of the most significant aspects of a teacher's quality performance and a complex phenomenon, so it is necessary to further delve into the content of classroom management strategies and their possible results.

5. Conclusion

A classroom management strategy focused on student external behaviour is one of six management approaches that a teacher can use to correct student misbehaviour. The analysis of the learning data of four Lithuanian schools with an unfavourable SES context shows that the progress of students in subjects of mathematics and biology is not related to the teacher's praise, although such an intervention tool can be used if it is characterized by individual attention and care. It was also found that as the number of remarks sent by the mathematics teacher to the student and/or parents increases, the probability of getting a lower math grade increases, meaning that remarks are not effective for higher student achievement. Analysis of the scientific literature shows that in order to create a favourable learning environment for students from low SES, teachers must first try to avoid classroom management problems by building good relationships with students, choosing an appropriate teaching strategy, adopting a growth mindset, and reducing working memory demands for the students who have these difficulties.

6. Acknowledgements

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