

Routledge
Taylor & Francis Group

Educational Studies

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/ceds20

The relation between science teachers' classroom management skills and their cognitive flexibility

Esra Gecikli & Emre Ak

To cite this article: Esra Gecikli & Emre Ak (2022): The relation between science teachers' classroom management skills and their cognitive flexibility, Educational Studies, DOI: 10.1080/03055698.2022.2150513

To link to this article: https://doi.org/10.1080/03055698.2022.2150513

Published online: 28 Nov 2022.

Submit your article to this journal

Article views: 53

View related articles

View Crossmark data

Full Terms & Conditions of access and use can be found at
https://www.tandfonline.com/action/journalInformation?journalCode=ceds20

EDUCATIONAL STUDIES
https://doi.org/10.1080/03055698.2022.2150513

Routledge
Taylor & Francis Group

Check for updates

The relation between science teachers' classroom management skills and their cognitive flexibility

Esra Gecikli[a] and Emre Ak[b]

[a]Department of Mathematics and Science Education, Atatürk University Faculty of Education, Erzurum, Turkey; [b]Science Teacher at a state school in Erzurum, MS graduate from Atatürk University, Erzurum, Turkey

ABSTRACT

This study is intended to determine science teachers' cognitive flexibility and their classroom management skills, and to examine the relationship between teachers' cognitive flexibility and their classroom management skills. The study was carried out through the use of correlational survey model. In the study carried out with 261 participants, science teachers' levels of cognitive flexibility and their classroom management skills are tried to be explained through descriptive analyses, and the relation between teachers' cognitive flexibility and their classroom management skills is explained through Structural Equation Model (SEM). It has been observed in the study that science teachers have a high level of cognitive flexibility and classroom management skills. In addition, a model correlating variable of alternatives and control, which are the sub-dimensions of cognitive flexibility, with classroom management skills has been built and tested. Fit indices of the model have demonstrated that the model is statistically acceptable. Findings show that there is a positive and significant relation between the alternatives sub-dimension of cognitive flexibility and classroom management skills while there is no significant relation between the control sub-dimension of cognitive flexibility and classroom management skills.

ARTICLE HISTORY
Received 2 July 2022
Accepted 7 November 2022

KEYWORDS
Cognitive flexibility; classroom management; science teachers; structural equation modelling

Introduction

Cognitive flexibility, in its broadest sense, is the willingness to produce alternative options when faced with different situations and the ability to adapt oneself to these situations (Kim and Omizo 2005). Spiro and Jehng (1990) define cognitive flexibility as having the capacity of reviewing a solution quickly to adapt to unforeseen situations. That is, individuals with cognitive flexibility respond to changing environments more responsively with their alternative perspectives (Spiro and Jehng 1990, p. 165).

Cognitive flexibility is one of the crucial cognitive strategies for teachers since the nature of their jobs require it. The reason for this is that creating a productive and positive learning environment at classroom is difficult for teachers (Hardin 2011; Weinstein and Novodvorsky 2015). In socially dynamic teaching processes, teachers are faced with different situations stemming either from students themselves or the class as a whole.

CONTACT Esra Gecikli esra.gecikli@atauni.edu.tr Department of Mathematics and Science Education, Faculty of Education Atatürk University, Yakutiye, Erzurum, 25240, Turkey

© 2022 Informa UK Limited, trading as Taylor & Francis Group

As it is impossible to apply one solution or limited number of solutions to all situations, cognitive flexibility may be regarded as a metacognition for a successful teaching process (Lin 2013).

Teachers contact humans directly and come across different events, situations and characters. Therefore, it is important for them to have high cognitive flexibility to adapt themselves to changing conditions and come up with different solutions. Teachers with cognitive flexibility can make the communication between partners of education stronger, prove to be constructive in the solution of problems they face, maintain a positive interaction with students, and activate students' communication and harmony with one another, which will in turn increase the quality of education and teaching. Teachers who can use their cognitive skills flexibly are expected to be more tolerant in cases of conflicts experienced in interpersonal relations since they trust themselves and be more moderate in their verbal communication (Martin and Anderson 1998). Teachers' possession of cognitive flexibility plays a major role in responding to the needs of students with individual differences, increasing students' level of success, and improving their social development and communicative skills (Esen-Aygün and Şahin-Taşkın 2019). In addition, cognitive flexibility enables teachers to develop different perspectives for probable problems, not to react with bias and arrive at probable solutions (Beversdorf et al. 1999).

Teachers with cognitive flexibility can maintain classroom management actively by undertaking such tasks as enabling communication in the classroom environment, finding solutions for problems playing a constructive role, and providing a harmonious and regular study in the learning environment (Fitzgerald 1997). Classroom management includes preparing a convenient environment for learning at classroom, designing the classroom physically, arranging the relation and communication of the learning environment on the basis of certain rules, and improving motivation (Norris 2003). Teachers are supposed to be the people who plan the process of learning, find solutions to the problems occurring in this process, and work out the solutions effectively at the right time; in short, they must be people having a great skill of classroom management. They must be able to work out suitable solutions when they are faced with different problems resulting from undesirable student behaviour using their classroom management skills (Aloe, Amo, and Shanahan 2014).

Teachers must use time fruitfully and must not lose time, must prevent students from losing their attention and must not allow any disruption in the flow of the course while providing solutions for the problems. It is essential for teachers to identify any kind of problems in the process of learning quickly, choose the most effective solution from among alternative solutions and apply it for an efficient classroom management (Rusk 2016). Therefore, it is necessary for teachers to use their minds flexibly in order to maintain classroom management efficiently which includes planning the course, designing a suitable classroom environment and finding solutions for the problems they face (Esen-Aygün and Şahin-Taşkın 2019).

Spiro et al. (1988) argue that teachers must allow students to reveal their own perspectives and develop different perspectives accordingly; to do so, teachers must design a learning environment that will meet the needs of students. It is thought that teachers with cognitive flexibility can realise that easier. A teacher with cognitive flexibility knows how to organise learning environments that will meet the needs of students and run the process of learning fittingly. Cognitive flexibility helps teachers to design

constructive learning conditions, apply these conditions and assess them (Vu Minh and Herbst 2008). Thus, it might be argued that teachers with a high level of cognitive flexibility can overcome difficult situations they face and improve their skills of classroom management.

This study is intended to determine science teachers' cognitive flexibility and classroom management skills and to examine the relation between their cognitive flexibility and classroom management skills. Cognitive flexibility and classroom management skills are two concepts used actively as far as the profession of teaching is concerned. It is a desirable thing for teachers to have a high level of cognitive flexibility and classroom management skill. The target in teacher training departments is to train teachers in such a way as to help them have a high level of cognitive flexibility and to offer a curriculum that will minimise the level of occupational burnout among teacher candidates in their professional life. Therefore, it is expected that this study will contribute to further studies on cognitive flexibility and occupational burnout and to the literature of the field.

Answers were sought to the following questions in the study:

(1) How skilful science teachers are in classroom management?
(2) What is the level of cognitive flexibility among science teachers?
(3) Does the level of cognitive flexibility possessed by science teachers predict their classroom management skills?

Method

The study was carried out through the use of correlational survey model to determine science teachers' cognitive flexibility and classroom management skills and to examine the relation between their cognitive flexibility and classroom management skills. In studies done through correlational survey model, the purpose is to reveal the current situation by the analyses of the data obtained from many participants (Karasar 2015). As it was intended to examine the relations of several variables with one another as well as the direction and strength of these relations (Büyüköztürk et al. 2018), correlational survey model was preferred for the study. Because the data were collected at one time, the study is a cross-sectional one (Cresswell, 2017, p. 157).

Sample

The study was applied upon 261 science teachers working in a province in the Eastern Anatolian Region of Turkey. These teachers were chosen through maximum sampling. The data were collected in the spring term of 2019–2020 academic year. 183 participants (70%) were female while 78 participants were male (30%). 122 participants (47%) had a 0 to 5 years' teaching experience while 75 teachers (29%) had a 6 to 10 years' teaching experience. 29 teachers (11%) had a 11 to 15 years' teaching experience while 34 teachers had been working at schools more than 16 years. 248 teachers (95%) that participated in the study work at a state secondary school while 13 teachers (5%) work at private schools. 101 teachers (39%) work in city centre, 72 of them (28%) in districts and 88 teachers (28%) in villages.

Means of collecting data

"Classroom Management Skills Scale" (CMSS) and "Cognitive Flexibility Inventory" (CFI) were used as means of collecting data in this study.

Classroom management skills scale

CMSS was developed by Delson-Karan (1984) and adapted to Turkish by Yalçınkaya and Tonbul (2002). Yalçınkaya and Tonbul (2002) state that the scale has 25 items and 6 dimensions. The scale is a five-point likert scale. The items in the scale are ranked as "very good", "good", "average", "weak" and "poor". Korkut (2009) later updated this scale by employing a factor analysis and reduced the number of the items to 15, and the dimensions to 3. The dimensions in this updated version are "plan-program activities and physical order" (items 1, 2, 3, 4, 6, 12), "arrangement of teacher-student relations and time management" (items 5, 7, 8, 9, 10) and "in-class interaction and behaviour arrangements" (items 11, 13, 14, 15). Korkut (2009) also states that the scale could also be used as a one-dimensional scale. In this study that updated version of classroom management skills scale was used.

As the structure of the scale was known, evidence of structural validity was sought through confirmatory factor analysis (CFA) (Brown 2015). First, an analysis of normality was done for the hypothesis of CFA and it was observed that the hypothesis of normality was provided for the whole of the scale and its dimensions.

Amos program was used to carry out CFA for both the three-dimensional and one-dimensional versions. The results of CFA performed without modification for the three-dimensional model demonstrated that values apart from x^2/df were not consistent with the model, and thus, modification suggestions were examined. In accordance with modification suggestions, error variances between Item 14 and Item 15, and between Item 3 and Item 4 were correlated. These modifications were made in accordance with theoretical reasons and by correlating the items under the same factor (Çokluk et al., 2016). As a result of the modifications, it was observed that there were improvements in the values of CFI, GFI, IFI, TLI ve RMSEA. The fit indices of the model following the modifications were $\chi 2/df = 2.183$, CFI =.92, GFI =.91, TLI =.90 and RMSEA =.067, SRMR=.054. That $\chi 2/sd$ value is smaller than 3, RMSEA and SRMR value is smaller than .08, CFI, GFI, IFI and TLI value is bigger than .90 demonstrates that the consistency between the model and the data is acceptable (Bentler 1990; Byrne 2011; Hu and Bentler 1999; Seçer 2013; Sharma et al. 2005; Tucker and Lewis 1973). Modifications of three-dimensional CFA were applied for the one-dimensional model. Fit indices of the one-dimensional model were $\chi 2/df = 2.14$, CFI =.92, GFI =.91, TLI =.90 and RMSEA =.066, SRMR=.054 and it was concluded that the scale could also be used in its one-dimensional model (Korkut 2009). The Cronbach Alpha values calculated for this study were .88 (for the scale in general), .77 (for the plan-program activities and physical order sub-scale), .71 (for the arrangement of teacher–student relations and time management sub-scale) and .73 (for in-class interaction and behaviour arrangements sub-scale).

Cognitive flexibility inventory

Cognitive Flexibility Inventory (CFI) has been developed by Dennis and Vander Wal (2010) and adapted to Turkish by Gülüm and Dağ (2012). The inventory is made up of two sub-scales and

20 items. The alternatives scale consists of 13 items (items 1, 3, 5, 6, 8, 10, 12, 13, 14, 16, 18, 19 and 20) while the control scale consists of 7 items (items 2, 4, 7, 9, 11, 15 and 17). The control scale includes negative statements except item 15 and is coded reversely for analyses. The alternatives scale includes items expressing that one can provide alternative solutions for difficult situations or there can be alternative explanations for the probable reasons for the situations and behaviour faced. As for the control scale in the inventory, it includes items expressing that difficult situations could be controlled. The inventory is a five-point likert inventory. The items of the inventory are ranked as "strongly disagree", "disagree", "neutral", "agree" and "strongly agree". If the score obtained from the inventory is high, it refers to high cognitive flexibility (Dennis and Vander Wal 2010).

The confirmatory factor analysis of CFI for science teachers was done through CFA (Brown 2015) in this study. First, an analysis of normality was done for the hypothesis of CFA and it was observed that the hypothesis of normality was provided for the whole of the scale and its dimensions.

The results of CFA without modification demonstrated that the values were inconsistent with the model and modification suggestions were examined. In accordance with modification suggestions, item 15 of the control scale was placed in alternatives scale. In their study in which they adapted CFI into Turkish, Sapmaz (2013) stated that item 15 of the inventory, which originally took place in control scale of the inventory, began to take place in the alternatives scale after they carried out exploratory factor analysis. Sapmaz (2013) placed and assessed the mentioned item in its control scale when they carried out CFA in their study they applied upon university students and had no problem in fit indices. In addition, Parlaktaş (2018) in his study regarded the mentioned item as an overlapping one after exploratory factor analysis and preferred to exclude it from the inventory. However, in the present study, item 15 was placed in alternatives scale in accordance with modification suggestions as it seemed more suitable for the alternatives scale although it existed in the control scale. Error variances between item 18 and item 19, between item 19 and item 20, and between item 18 and item 20 were correlated in accordance with modification suggestions. Modifications were made in accordance with theoretical reasons and by correlating the items under the same factor (Çokluk, Şekercioğlu, and Büyüköztürk 2016). After modifications, improvements were observed in the values of CFI, GFI, IFI, TLI and RMSEA. Fit indices of the model after modficiations were $\chi 2/df = 2.539$, CFI =.91, GFI =.86, IFI=.92, TLI =.90, RMSEA =.077 and SRMR=.0588. That $\chi 2/sd$ value was smaller than 3, RMSEA and SRMR value was smaller than .08, and CFI, IFI and TLI values were bigger than .90 demonstrates that the consistency between the model and the data is acceptable (Bentler 1990; Byrne 2011; Hu and Bentler 1999; Seçer 2013; Sharma et al. 2005; Tucker and Lewis 1973). It can be claimed that the model demonstrated a sufficient level of consistency as there is consistency for RMSEA and $\chi 2/sd$, CFI, IFI, TLI and GFI value is close to .90, which is the level of acceptability (Hair, Ringle, and Sarstedt 2011). As far as all the results are concerned, it can be stated that the data obtained from CFI have sufficient structural validity. In this study, Cronbach Alpha value was found to be .89 for the scale in general, .93 for the alternatives scale (14 items), and .89 for the control scale (6 items).

Analyses of the data

Structural Equation Model (SEM) was used to determine the relation between science teachers' classroom management skills and their cognitive flexibility. Structural Equation

Model is a statistical technique that enables the modelling of the relations between observed and latent (Jöreskog and Sörbom 1993; Leech, Barrett, and Morgan 2005). Because SEM, as opposed to traditional techniques, demonstrates measuring errors belonging to observed variables, it has proved to be a preferred technique (Stevens 2009). The primary purpose of SEM is to demonstrate whether theoretical models are confirmed by data set or not. Fit indices are used in order to determine whether the theoretical structure to be tested is confirmed by the data set or not (Bentler 1990). There are different types of SEM like factor analysis, path analysis as it is a combination of canonical correlation and regression analysis (Tabachnick, Fidell, and Ullman 2007), CFA (measurement model) and structural model. Structural model was used in this study in order to test the relations between observed variables and latent variables, which are supposed to be measured through observed variables (Raykov and Marcoulides 2006; Wetson and Gore 2006).

Findings

In this section, descriptive analyses of CMSS and CFI showing science teachers' cognitive flexibility and classroom management skills, the model tested, and consistency values are presented.

Table 1 demonstrates average values, standard deviation, and maximum and minimum values regarding science teachers' classroom management and cognitive flexibility. Arithmetic mean of teachers in the scale of classroom management skills is $\overline{X} = 4{,}37$, that of plan-program activities and physical order is $\overline{X} = 4{,}20$, the mean of arrangement of teacher–student relations and time management is $\overline{X} = 4{,}35$ and that of in-class interaction and behaviour arrangement is $\overline{X} = 4{,}50$. The arithmetic mean in cognitive flexibility inventory is $\overline{X} = 4.23$, that of alternatives scale is $\overline{X} = 4.26$, and the mean of control scale is $\overline{X} = 4.00$. As far as the arithmetic means of science teachers' classroom management and cognitive flexibility levels are concerned, it is observed that science teachers' levels of classroom management skills and cognitive flexibility are high.

Findings show that science teachers are at a very good level in terms of making plan-program and preparing physical order as far as classroom management is concerned. It is also observed that the averages of the items about science teachers' skills related to arranging teacher–student relations and time management are quite high, which demonstrates that science teachers feel that they are very good at arranging in-class interaction and behaviour arrangements.

Table 1. Descriptive statistics of CMSS and CFI.

	N	Number of items	Min.	Max.	$\overline{X}$	s.s.	Skewness	Kurtosis
CMSS	261	15	2.87	5.00	4.37	0.41	−.670	.559
PPA	261	6	2.33	5.00	4.20	0.47	−.517	.913
ATSR	261	5	3.00	5.00	4.35	2.18	−.788	.251
ICI	261	4	2.75	5.00	4.50	1.90	−.875	.306
CFI	261	20	2.55	5.00	4.23	0.475	−.466	.205
Alternatives	261	14	2.56	5.00	4.26	0.479	−.710	1.109
Control	261	6	1.00	5.00	4.00	0.877	−1.361	1.862

PPA refers to "plan-program activities and physical order", ATSR refers to "arrangement of teacher-student relations and time management", ICI refers to "in-class interaction and behaviour arrangements".

It is also found in the findings that the averages of the items in the alternatives scale are very high. The control scale consists of six items, all of which are negative. As seen in Table 1, the lowest average value for this scale ($\overline{X}$1.74) belongs to the seventh item while the highest average value ($\overline{X} = 2.37$) belongs to the second item. In this scale, high value demonstrates that one's tendency to control difficult situations is low and low value shows that this tendency is high.

In the study, the relation between science teachers' classroom management skills and their cognitive flexibility has been explained by means of Structural Equation Model (SEM). The hypotheses of the study have been tested and it has been realised that all hypotheses are confirmed.

The relation between the dimensions of science teachers' classroom management skills and the dimensions of cognitive flexibility success skills was analysed by Pearson's Correlation Coefficient. Table 2 shows bivariate correlations between the variables of the study.

Table 2 shows that Pearson correlations between variables are statistically significant. It might be said that science teachers' classroom management skills have a moderate ($.30 \leq r \leq .70$) and positive relation with cognitive flexibility and alternatives scale while they have a low and positive relation with control scale.

The hypothesis that there is a significant relation between alternatives scale and control variables as the sub-dimensions of cognitive flexibility on the one hand and classroom management skills on the other was tested in the study. Figure 1 shows the structural model demonstrating the relation between alternatives and control variables on the one hand and science teachers' classroom management skills on the other.

In this model, CMS was firstly tested with respect to three sub-dimensions; however, it was realised that fit indices were found to be unacceptable. Korkut (2009) states the scale could also be tested with respect to one dimension, which was confirmed in this study through CFA. Therefore, CMS was tested with respect to one dimension and error variances were correlated on the basis of modification suggestions in order to increase the values of fit indices (e7-e8). Later, when the fit indices relating the contributions of variables to the model were examined, it was observed that the model gave significant results that were acceptable (Hair, Ringle, and Sarstedt 2011) statistically acceptable ($\chi 2 = 1011{,}803$, $df = 551$, $\chi 2/df = 1.836$, $RMSEA = 0.057$, $SRMR = 0.059$, $CFI = 0.90$, $IFI = .90$).

Table 2. Bivariate correlations between variables.

Variables (*N*=261)	CMS	PPAPO	ATSRTM	ICIBA
CF	.392**	.366**	.320**	.345**
A	.422**	.405**	.336**	.365**
C	.155**	.123*	.144*	.148*

* p <0.05, ** p <0.01 Correlation coefficient as absolute value shows low level of relation if it is between the values .00 to .30, moderate level of relation if it is between the values .30 to .70, and high level of relation if it is bigger than the value .70 (Büyüköztürk et al. 2018).

CMS: Classroom Management Skills, PPAPO: Plan-Program Activities and Physical Order, ATSRTM: Arrangement of Teacher–Student Relations and Time Management, ICIBA: In-Class Interaction and Behaviour Arrangements, CF: Cognitive Flexibility, A: Alternatives, C: Control

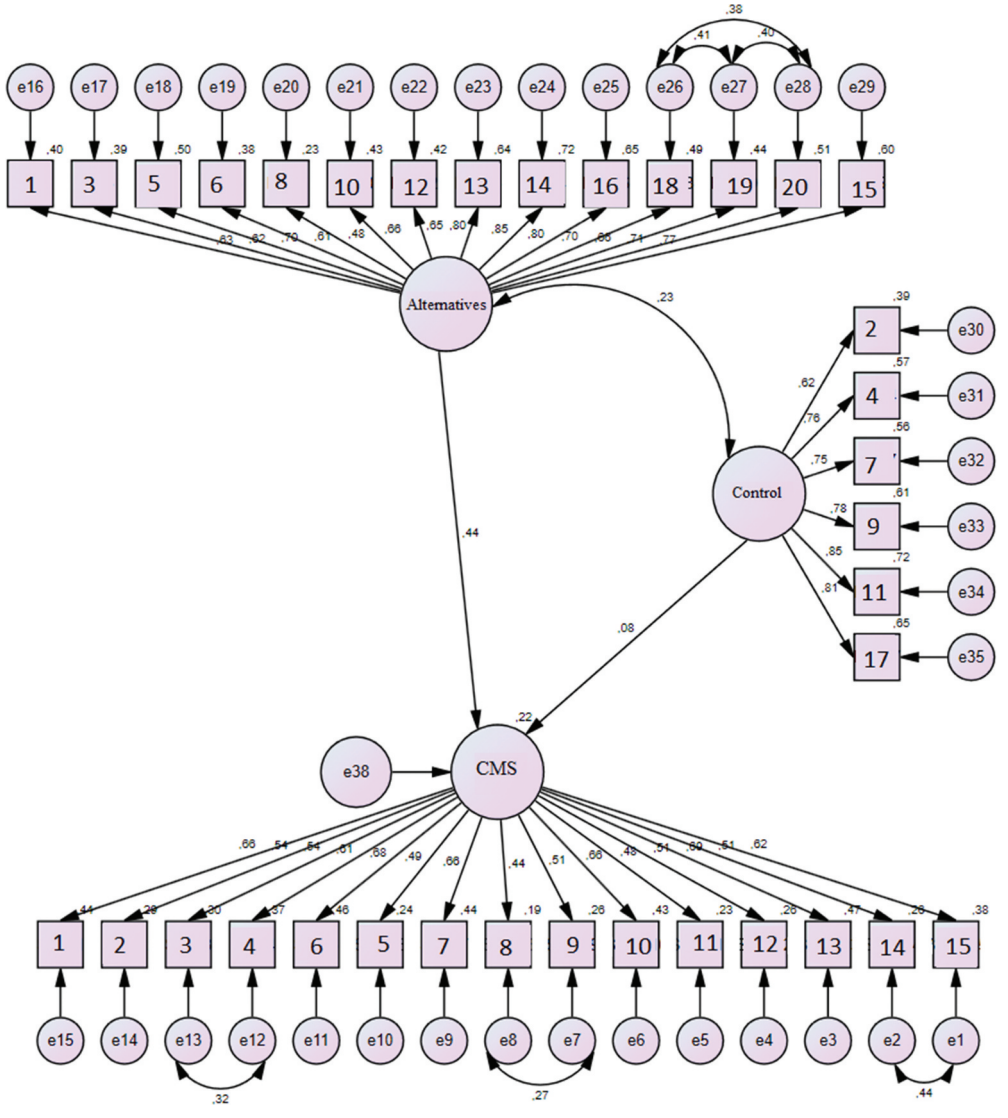


Figure 1. Structural Model Showing the relation between Alternatives &Control, and Classroom Management Skills. CMS: Classroom Management Skills

Figure 1 demonstrates the structural model of the relation between the sub-dimensions of science teachers' cognitive flexibility and their classroom management skills. SEM results of this model are given in Table 3.

As far as SEM results are concerned, it is observed that there is a statistically significant and positive relation between the alternatives, the sub-dimension of cognitive flexibility, and classroom management skills. There is not a significant relation between control latent variable and classroom management skills; alternatives latent variable's estimate of CMS latent variable at $p < .01$ significance level is $\beta = .44$.R^2 value, which shows what percentage of changes in the dependent variable could be explained with the changes in

Table 3. SEM results of the structural model.

Structural Relations	Estimation	Standardized Estimate (β)	Standard error	Critical Ratio (C.R.)	R^2	p
CMS <— Alternatives	.48	.44	.089	5.435	.22	***
CMS <— Control	.05	.08	.036	1.269		.204

***<0.01.

the independent variable, is found to be .22. this value shows us that 22% of the variance in the CMS could be explained through alternatives and control variables.

Discussion

Following results were obtained in the study carried out to determine cognitive flexibility of science teachers and their classroom management skills together with the relation between cognitive flexibility of science teachers and their classroom management skills.

The first research question of the study was "What is the level of science teachers' classroom management skills?". To provide an answer to this question, defining statistical values relating science teachers' levels of classroom management skills were examined and it was found out that science teachers' classroom management skills were high. As far as the literature is concerned, there are many studies done with different in-field teachers that yield similar results (Çetin 2009; Erol 2014; Güven and Cevher 2005; Kars, 2007; Korkmaz, 2007; Martin and Shoho 2000; Ocakcı 2017; Olçun 2020; Tunca 2010); however, in some studies, levels of classroom management skills are found to be low (Karaman 2016; Shamina and Mumthas 2018). In addition, Yalçınkaya and Tonbul (2002) found the level of classroom management skills as moderate in their studies. It was observed in this study that science teachers find themselves most efficient in plan-program activities and physical order. This is followed by arrangement of teacher–student relations and time management. Science teachers find themselves least efficient in in-class interaction and behaviour arrangement.

The second research question of the study was "What is the level of science teachers' cognitive flexibility?" In order to define it, average values of alternatives and control scale together with the general scale were calculated and it was found that science teachers' levels of cognitive flexibility were high. Kılıç and Demir (2012) count cognitive flexibility as one of the qualifications that must not only be possessed by teachers but be gained by students. In addition, Cognitive Flexibility Theory, basic principles of which overlap with (Chieu 2007), provides a framework for teaching planners and teachers to design interesting learning environments and situations (Cheng and Koszalka 2016). Therefore, science teachers' possession of high level of cognitive flexibility is as a desired attribute. It is possible to encounter studies that show findings of high-level cognitive flexibility in the literature (Çuhadaroğlu 2013; Esen-Aygün and Şahin-Taşkın 2019; Huffman and Piggrem 2003; Yazgan 2021). It has been observed in these studies that science teachers reach the highest average in the alternatives scale, which is the related to finding different solutions when faced with difficult situations. In addition, science teachers' possession of high average in control scale expresses that they feel they can control difficult situations. It is known that teaching as a profession requires dense interaction even when the interaction between the student, administrators and parents is taken into consideration

only. Therefore, there is a high probability of facing different people, behaviours and situations (Yaşar 2016). Teachers who can provide alternative solutions to problems and keep control in difficult situations can be said to manage teaching process easier. Accordingly, it is crucial for teachers to have a high level cognitive flexibility.

The third research question of the study was "Does the level of cognitive flexibility as possessed by science teachers predict their classroom management skills?" SEM was used to seek an answer to this question. A model was built that correlates alternatives and control scale as sub-dimensions of cognitive flexibility with classroom management skills and the model was tested. Fit indices of the constructed model proved that the model is statistically acceptable. According to the results, there is a positive and significant relation between alternatives sub-dimension of cognitive flexibility and classroom management skills while there is not a significant relation between the control sub-dimension and classroom management skills. It was observed with the regression value calculated that 22% of the total variance in classroom management skills could be explained with cognitive flexibility. There are many studies trying to demonstrate the relation between cognitive flexibility and various variables in the literature. Arıcı Özcan (2019) in her study showed that cognitive flexibility and conscious awareness had an intermediary role in the relation between perceived stress and bearing problems while Ocakcı (2017) demonstrated in their study that cognitive flexibility had a partly intermediary role in the relation between personal characteristics and life satisfaction. Kuyumcu and Kirazcı (2020) stated that there is a statistically significant and negative relation between educational stress and cognitive flexibility. A study was conducted by Smith and Konik (2021) to examine the relationship between five major personality traits, cognitive flexibility, and life satisfaction. It was observed that each of the five major personality traits predicted cognitive flexibility, cognitive flexibility significantly predicted life satisfaction and cognitive flexibility mediated the relationship between the five major personality traits and life satisfaction.

Although there are many studies in which the relation between cognitive flexibility and various variables, there are no studies examining the relation between cognitive flexibility and classroom management. However, there are studies in the literature examining the relation between cognitive flexibility and some concepts that would affect teachers' classroom management skills. For instance, Kaçay (2021) stated that empathetic tendencies of physical education teachers were important predictors of cognitive flexibility and teacher professionalism. In another study on teachers, it was found out that there was a positive and significant relation between teachers' attitudes towards multicultural education and their cognitive flexibility (Bozkurt, Kıran, and Alıcı 2020). In addition, Ekici (2018) proved that teachers' emotional reactivity declined as their level of cognitive flexibility increased. Başpınar (2019) concluded that metacognitive and cognitive flexibility skills of candidates of primary school teaching were powerful predictors of professional competence, and that there is a moderate and positive relation between cognitive flexibility skills and professional competence.

Since classroom management includes planning learning activities, making the classroom environment fit for learning process, preventing probable problems of classroom environment before they arise, and providing a suitable solution for problems, it is observed that cognitive flexibility is compatible with such aspects of classroom teaching as harmony, attention, analyticity, and creating alternatives using clues when one is faced with unexpected situations (Kaptanbaş Gürbüz and Sezgin Nartgün 2018). Therefore, it is

thought that determination of how teachers' cognitive flexibility predicts their classroom management skills will contribute to the literature.

Based on the findings and on the reality that an efficient classroom management might improve the quality of teaching activities, it is recommended that activities that will help improve cognitive flexibility of teachers could be designed and in-service trainings for similar purposes could be given. As for teacher candidates, it is thought that courses and/or activities intended to improve cognitive flexibility could be added to the curricula.

The main limitation of the study is that it was carried out solely with science teachers. It is believed that this study is an initial step towards the examination of the relation between cognitive flexibility and classroom management skills. Further studies could be carried out with different groups of teachers. And finally, teachers' classroom management skills could be determined by in-class observations and the relation between cognitive flexibility and classroom management skills could be examined accordingly.

Acknowledgements

This study is an extract from a Master's Thesis written by Emre AK and supervised by Dr. Esra GECIKLI.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributors

Esra GECIKLI is an assistant professor in the Department of Mathematics and Science Education at Ataturk University. She received her PhD (2011) in Chemistry from Atatürk University. Her main research interests cover science education, teacher training and STEM education.

Emre AK currently works as a teacher of science at a state school in Erzurum, TURKEY. He finished his MS in the field of Science Education at Atatürk University in 2022.

ORCID

Esra Gecikli http://orcid.org/0000-0003-4402-2626

References

Aloe, A., L. Amo, and M. Shanahan. 2014. "Classroom Management Self-Efficacy and Burnout: A Multivariate Meta-Analysis." *Educational Psychology Review* 26 (1): 101–126. doi:10.1007/s10648-013-9244-0.

Arıcı Özcan, N. 2019. "The Mediator Role of Cognitive Flexibility and Mindfulness in Relationship Between Perceived Stress and Distress Tolerance Among University Students." *Online Submission* 6 (9): 316–332. doi:10.5281/zenodo.3596983.

Başpınar, Z. 2019. "*Üstbilişsel ve bilişsel esneklik becerilerinin öğretmenlik mesleki yeterliliklerini yordama gücü. [The predictive role of metacognitive and cognitive flexibility skills on professional teaching qualifications].*" Master's thesis, Available from YÖK Tez Merkezi (Thesis No.555327).

Bentler, P. M. 1990. "Comparative Fit Indexes in Structural Models." *Psychological Bulletin* 107 (2): 238–246. doi:10.1037/0033-2909.107.2.238.

Beversdorf, D. Q., J. D. Hughes, B. Steinberg, L. D. Lewis, and K. M. Heilman. 1999. "Noradrenergic Modulation of Cognitive Flexibility in Problem Solving." *Neuroreport* 10 (13): 2763–2767. doi:10.1097/00001756-199909090-00012.

Bozkurt, B., B. Kıran, and D. Alıcı. 2020. "Öğretmen Adaylarının Çok Kültürlü Eğitime Yönelik Tutumlarının Yordayıcıları Olarak Suriyelilere Yönelik Toplumsal Uzaklık Ve Bilişsel Esneklik. [Social Distance and Cognitive Flexibility for Syrians as a Predictor of the Teacher Candidates' Attitudes of Multicultural Education]." *Mersin Üniversitesi Eğitim Fakültesi Dergisi* 16 (2): 382–393. doi:10.17860/mersinefd.684692.

Brown, T. A. 2015. *Confirmatory Factor Analysis for Applied Research*. 2nd. New York: The Guilford.

Büyüköztürk, Ş., E. K. Çakmak, Ö. E. Akgün, Ş. Karadeniz, and F. Demirel. 2018. *Bilimsel araştırma yöntemleri*. 2. baskı ed. Ankara: Pegem Akademi.

Byrne, B. M. 2011. "Testing the Factorial Validity of Scores from a Measuring Instrument: Second-Order Confirmatory Factor Analysis Model." In *Structural Equation Modeling with Mplus*, 143–164. England: Routledge.

Çetin, F. 2009. "*Eğitim fakültelerinde görev yapan öğretim elemanlarının sınıf yönetimi ile ilgili davranışlarının incelenmesi [Examination of the behaviors of the instructors serving in education faculties with regards to the classroom management]*." Doctoral dissertation, Available from YÖK Tez Merkezi (Thesis No. 235593).

Cheng, J., and T. A. Koszalka 2016. "Cognitive Flexibility Theory and Its Application to Learning Resources." concept paper, https://ridlr.syr.edu/wp-content/uploads/2020/11/ConceptPaper2016-CFT.pdf

Chieu, V.M. 2007 An operational approach for building learning environments supporting cognitive flexibility. *Journal of Educational Technology & Society* 10 (3): 32–46.

Çokluk, Ö., G. Şekercioğlu, and Ş. Büyüköztürk. 2016. *Sosyal bilimler için çok değişkenli istatistik: SPSS ve LISREL uygulamaları*. Ankara: Pegem Akademi.

Çuhadaroğlu, A. 2013. "Bilişsel esnekliğin yordayıcıları." *Cumhuriyet Uluslararası Eğitim Dergisi* 2 (1): 86–101.

Delson-Karan, M. 1984. "A Three-Dimensional Approach to Evaluating Teaching Performance." *Canadian Modern Language Review* 40 (3): 414–427. doi:10.3138/cmlr.40.3.414.

Dennis, J. P., and J. S. Vander Wal. 2010. "The Cognitive Flexibility Inventory: Instrument Development and Estimates of Reliability and Validity." *Cognitive Therapy and Research* 34 (3): 241–253. doi:10.1007/s10608-009-9276-4.

Ekici, C. 2018. "Öğretmenlerin teknolojik pedagojik alan bilgisi (TPAB) ile sınıf yönetimi becerileri arasındaki ilişki (Çanakkale ili örneği) [*The relationship between teachers' technological pedagogical content knowledge (TPAB) and classroom management skills (Çanakkale province case)]*." Master's thesis, Available from YÖK Tez Merkezi (Thesis No. 528831).

Erol, E. 2014. "*Sınıf öğretmenlerinin sınıf yönetimine ilişkin yeterlilikleri (Manisa ili Sarıgöl, Alaşehir ilçeleri örneği) [Classroom management competencies of teachers (Manisa province Sarıgöl, Alaşehir towns model)]*." Master's thesis, Available from YÖK Tez Merkezi (Thesis No. 375687).

Esen-Aygün, H., and Ç. Şahin-Taşkın. 2019. "Öğretmen adaylarının öğretmenlik uygulaması kapsamında bilişsel esnekliğe ilişkin görüşleri [Pre-service teachers' views on cognitive flexibility within the scope of teaching practice)." *Eğitimde Nitel Araştırmaları Dergisi* 7 (4): 1475–1499. doi:10.14689/issn.2148-2624.1.7c.4s.8m.

Fitzgerald, G. E. 1997. "An Interactive Multimedia Program to Enhance Teacher Problem-Solving Skills Based on Cognitive Flexibility Theory: Design and Outcomes." *Journal of Educational Multimedia and Hypermedia* 6 (1): 47–76.

Gülüm, İ. V., and İ. Dağ. 2012. "Tekrarlayıcı düşünme ölçeği ve bilişsel esneklik envanterinin Türkçeye uyarlanması, geçerliliği ve güvenilirliği." *Anadolu Psikiyatri Dergisi* 13: 216–223.

Güven, E. D., and N. Cevher. 2005. "Okul öncesi öğretmenlerinin sınıf yönetimi [The level of pre-school teachers' classroom management skills and its relations with different variables]." *Pamukkale Üniversitesi Eğitim Dergisi* 18 (18): 71–92.

Hair, J. F., C. M. Ringle, and M. Sarstedt. 2011. "PLS-SEM: Indeed a Silver Bullet." *J*journal of Marketing Theory and Practice 19 (2): 139–152. doi:10.2753/MTP1069-6679190202.

Hardin, C. J. 2011. *Effective Classroom Management: Models and Strategies for Today's Classrooms*. London: Pearson Higher Ed.

Hu, L. T., and P. M. Bentler. 1999. "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria versus New Alternatives." *Structural Equation Modeling-A Multidisciplinary Journal* 6 (1): 1–55. doi:10.1080/10705519909540118.

Huffman, K., and G. Piggrem. 2003. *Psychology in Action*. New York: John Wiley.

Jöreskog, K. G., and D. Sörbom. 1993. *Lisrel 8: Structural Equation Modeling with the SIMPLIS Command Language*. Lincolnwood: Scientific Software International Inc.

Kaçay, Z. 2021. "The Mediating Role of Cognitive Flexibility in the Effect of Empathic Tendency on Teacher Professionalism." *International Journal of Psychology and Educational Studies* 8 (1): 124–134. doi:10.17220/ijpes.2021.8.1.167.

Kaptanbaş Gürbüz, E., and Ş. Sezgin Nartgün. 2018. "Pedagojik formasyon programı öğrencilerinin bilişsel esneklik ve öz yeterlik düzeyleri." *Journal of International Social Research* 11 (55): 628–640. doi:http://dx.doi.org/10.17719/jisr.20185537235.

Karaman, S. Z. 2016. "*Öğretmenlerin sınıf yönetimi yeterlikleri ile mesleki profesyonellikleri arasındaki ilişki (Relationship between teachers profficiency of class management and profficiency of career)*." Master's thesis, Available from YÖK Tez Merkezi (Thesis No. 440782).

Karasar, N. 2015. *Araştırmalarda Rapor Hazırlama*. Ankara: Nobel Akademik Yayıncılık.

Kars, Y. E. 2007 *"Din kültürü ve ahlak bilgisi öğretmenlerinin kendi algılarına dayalı sınıf yönetimi yeterlikleri(Konak ilçesi örneği) Classroom management efficacies of teachers of religion culture and ethics knowledge based on their self-perceptions (in Konak district in İzmir)." Master's thesis, Available from YÖK Tez Merkezi (Thesis No. 209115).*

Kılıç, F., and Ö. Demir. 2012. "Sınıf öğretmenliği öğrencilerinin bilişsel koçluk ve bilişsel esnekliğe dayalı öğretim ortamlarının oluşturulmasına ilişkin görüşleri (Views of prospective classroom teachers regarding creating ınstructional environment based on cognitive coaching and cognitive flexibility." *Elementary Education Online* 11 (3): 578–595.

Kim, B. S. K., and M. M. Omizo. 2005. "Asian and European American Cultural Values, Collective Self-Esteem, Acculturative Stress, Cognitive Flexibility, and General Self-Efficacy Among Asian American College Students." *Journal of Counseling Psychology* 52 (3): 412–419. doi:10.1037/0022-0167.52.3.412.

Korkmaz, N. 2007. *"İlköğretim okullarında etkili sınıf yönetiminde öğretmen davranışlarının incelenmesi İstanbul - Tuzla ilköğretim okullarında pilot bir araştırma (The examination of the teachers' behaviours in effective class managemend at primary education schools example of Istanbul - Tuzla primary schools)*." Master's thesis, Available from YÖK Tez Merkezi (Thesis No. 211728).

Korkut, K. 2009. "*Sınıf öğretmenlerinin öz yeterlik inançları ile sınıf yönetimi beceri algıları arasındaki ilişki* (*The correlation between level of classroom teachers' self efficacy beliefs and classroom management ability perceptions*." Master's thesis, Available from YÖK Tez Merkezi (Thesis No. 250873).

Kuyumcu, B., and F. Kirazcı. 2020. "Lise öğrencilerinde bilişsel esneklik ve eğitim stresi arasındaki bağlantı: öğretmen kabul algısı yoluyla arabuluculuk (Mediator role of life goals in the relationship between cognitive flexibility and resilience in high school student)." *Türk Psikolojik Danışmanlık ve Rehberlik Dergisi* 10 (58): 515–530.

Leech, N. L., K. C. Barrett, and G. A. Morgan. 2005. *SPSS for Intermediate Statistics, Use and Interpretation*. 2nd ed. Mahvah: Lawrence Erlbaum Associates Inc.

Lin, Y. W. 2013. *The Effects of Cognitive Flexibility and Openness to Change on College Students' Academic Performance*. California: La Sierra University.

Martin, M. M., and C. M. Anderson. 1998. "The Cognitive Flexibility Scale: Three Validity Studies." *Communication Reports* 11: 1–9. doi:10.1080/08934219809367680.

Martin, N. K., and A. R. Shoho 2000. "Teacher Experience, Training, & Age: The Influence of Teacher Characteristics on Classroom Management Style." *The Annual Conference of the Southwest Educational Research Association*, Dallas.

Minh, C. V., and P. Herbst 2008. "Learning to Teach: Web-Based Interactive Rich-Media Technologies Supporting Cognitive Flexibility in Teacher Education." In *Society for information technology & teacher education international conference*, Las Vegas, (pp. 4579–4586). March. Association for the Advancement of Computing in Education (AACE).

Norris, J. A. 2003. "Looking at Classroom Management Through a Social and Emotional Learning Lens." *Theory and Practice* 4: 4–313. doi:10.1207/s15430421tip4204_8.

Ocakcı, E. 2017. "*Birleştirilmiş sınıf öğretmenlerinin sınıf yönetimi yeterlilikleri ve sınıf yönetimi ile ilgili görüşlerinin incelenmesi [Investigation of the class management qualifications and the views of multigrade classroom teachers about class management]*." Master's thesis, Available from YÖK Tez Merkezi (Thesis No. 469425).

Olçun, H. 2020. "*Fen bilgisi öğretmenlerinin sınıf yönetimi yeterliklerinin bazı değişkenlere göre incelenmesi [Investigation of classroom teaching competencies of science teachers according to some variables]*." Master's thesis, Available from YÖK Tez Merkezi (Thesis No. 617103).

Parlaktaş, B. 2018. "*Fen bilgisi öğretmen adaylarının laboratuvar öğrenme ortamı, bilişsel esneklikleri ve sosyal sorun çözme becerilerine yönelik algılarının incelenmesi [Examining the perceptions of science teacher candidates' toward laboratory learning environment, cognitive flexibilitiy and social problem solving skills]*." Master's thesis, Available from YÖK Tez Merkezi (Thesis No. 518288).

Raykov, T., and G. A. Marcoulides 2006. "A first course in structural equation modeling." Mahwah, MJ: Lawrence Erlbaum Associates, 238p

Rusk, R. B. 2016. "*A case study of classroom management practices and the influence on classroom disruptions*." Doctoral dissertation, Grand Canyon University.

Sapmaz, F. 2013. "Bilişsel esnekliğin değerlendirilmesi: bilişsel esneklik envanteri Türkçe versiyonunun geçerlik ve güvenirlik çalışmaları [Assessment of cognitive flexibility: Reliability and validity studies of Turkish version of the Cognitive Flexibility Inventory]." *Journal Minerals Environment* 46 (1): 143–162. doi:10.1501/Egifak_0000001278.

Seçer, İ. 2013. *SPSS ve LISREL ile pratik veri analizi*. Ankara: Anı Yayıncılık.

Shamina, E., and N. S. Mumthas. 2018. "Classroom Management: Implications for Teacher Preparation Programmes." *IOSR Journal of Humanities and Social Science* 23 (1): 41–44.

Sharma, S., S. Mukherjee, A. Kumar, and W. R. Dillon. 2005. "A Simulation Study to Investigate the Use of Cutoff Values for Assessing Model Fit in Covariance Structure Models." *Journal of Business Research* 58 (1): 935–943. doi:10.1016/j.jbusres.2003.10.007.

Smith, C. A., and J. Konik. 2021. "Who is Satisfied with Life? Personality, Cognitive Flexibility, and Life Satisfaction." *Current Psychology*. doi:10.1007/s12144-021-01359-6.

Spiro, R. J., R. L. Coulson, P. J. Feltovich, and D. K. Anderson. 1988. *Cognitive Flexibility Theory: Advenced Knowledge Acquisition in Ill-Struetured Domains*. Champaign, IL: University of Illinois, Center for the Study of Reading. doi:10.1017/CBO9780511529863.023.

Spiro, R. J., and J.-C. Jehng. 1990. "Cognitive Flexibility and Hypertext: Theory and Technology for the Nonlinear and Multidimensional Traversal of Complex Subject Matter." In *Cognition, Education, and Multimedia: Exploring Ideas in High Technology*, edited by D. Nix and R. J. Spiro, 163–205. Lawrence Erlbaum Associates, Inc. doi:10.1016/j.jbusres.2003.10.007.

Stevens, J. P. 2009. *Applied Multivariate Statistics for the Social Sciences*. New York: Routledge.

Tabachnick, B. G., L. S. Fidell, and J. B. Ullman. 2007. *Using Multivariate Statistics*, 481–498. Vol. 5. Boston, MA: pearson.

Tucker, L. R., and C. Lewis. 1973. "A Reliability Coefficient for Maximum Likelihood Factor Analysis." *Psychometrika* 38 (1): 1–10. doi:10.1007/BF02291170.

Tunca, Ö. 2010. "Duygusal zeka düzeylerinin sınıf yönetimi becerilerine etkisi ve bir araştırma [*Effects of emotioanal intelligence level on class management skills and a research]*." Master's thesis, Available from YÖK Tez Merkezi (Thesis No. 264508).

Weinstein, C. S., and I. Novodvorsky. 2015. *Middle and Secondary Classroom Management: Lessons from Research and Practice*. Boston: McGraw Hill.

Wetson, R., and P. A. Gore Jr. 2006. "A Brief Guide to Structural Equation Model." *The Counseling Psychologist* 34 (5): 719–751. doi:10.1177/0011000006286345.

Yalçınkaya, M., and Y. Tonbul. 2002. "İlköğretim okulu sınıf öğretmenlerinin sınıf yönetimi becerilerine ilişkin algı ve gözlemleri." *Ege Eğitim Dergisi* 6 (2): 96–103.

Yaşar, M. 2016. "*Öğretmenlerin sınıf yönetimi profilleri ile sınıflarında zorbalığın görülme sıklığı arasındaki ilişki [The relationship between teachers' classroom managment profiles and their perception level of bullying in their classrooms]*." Master's thesis, Available from YÖK Tez Merkezi(Thesis No. 460457).

Yazgan, A. D. 2021. "Öğretmen adaylarının bilişsel esneklik düzeyleri ile kültürel zekâ düzeyleri arasındaki ilişkinin incelenmesi." *Ahi Evran Üniversitesi Sosyal Bilimler Enstitüsü Dergisi* 7 (1): 212–231. doi:10.31592/aeusbed.803469.