



# Antecedents of job satisfaction: A moderated mediation model

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## Abstract

In social sciences, it is accepted that the concept of psychological resilience reduces stress and is characterized as a personal skill and supports the ability of individuals to cope with different events and situations. On the other hand, developments in the field of science and technology directly affect the working lives of individuals. These developments also increased the responsibilities of teachers, on the one hand, adapting to technological developments, and on the other hand, the responsibility of guiding the students in this regard. This research was carried out to determine the mediating effect of technostress level and the moderator effect of psychological resilience in the effect of digital literacy levels of teachers who teach online during the COVID-19 epidemic period on job satisfaction. The research, which was designed within the framework of the causal screening model, was carried out on 403 teachers. According to the findings obtained within the scope of the research, it was determined that techno-uncertainty and techno-complexity, which are technostress factors, play a mediating role in the relationship between digital literacy and job satisfaction. However, according to the results obtained, it was determined that psychological resilience plays a moderator role in the digital literacy-technostress relationship. On the other hand, within the scope of the research, the moderator effect of technostress and psychological resilience in the relationship between digital literacy and job satisfaction was tested and the research hypotheses were supported.

**Keywords** Psychological Resilience · Techno-Stress · Digital Literacy · Work Satisfaction

## Introduction

During the COVID-19 pandemic period, which affected the educational life of approximately 1.6 billion students, schools at all levels were negatively affected in 186 countries according to the data of the United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2020). In the studies (Cao et al., 2020; Husky et al., 2020; Sundarasan et al., 2020), the negative effects of this situation on students were revealed. On the other hand, countries have turned to distance education during the pandemic period. In the COVID-19 pandemic, the unpreparedness of the world population not only in medical terms but also in communication, access and business life brought many negativities such as stress. This situation has caused a tension in people with the use

of technological tools and equipment at an unaccustomed level. In this context, the individual's reaction to stress is shaped around various factors, including personal characteristics, social support and cultural characteristics (Kocjan et al., 2021: 2). At this point, it is especially important to carefully evaluate issues such as technostress and fatigue in the workplace. Training and supporting employees who lack experience in the use of technology can reduce the negative effects of technology use. In order to achieve this, it is necessary to know the employees closely and to have an idea about their personal characteristics. For example, it may be necessary to provide more support for neurotic individuals, as they may experience more fatigue (Oksanen et al., 2021: 8).

A large part of the lives of teachers who perform the profession of education and training are spent in schools. In this respect, teachers' being satisfied with their jobs and thus having high levels of job satisfaction are closely related to the quality of education services. Similarly, Barlı (2008), evaluates that the attitudes and behaviours of employees in organisations without job satisfaction may directly or indirectly harm the institutions. On the other hand, significant technological changes and developments necessitate the

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digitalisation of the materials used by teachers. Therefore, digital literacy level is a very important issue for teachers, especially in a period when courses are conducted remotely. The concept of digital literacy acts as a bridge to reach the source of information. In this respect, distance education has brought some difficulties due to the COVID-19 pandemic, especially due to the increasing technological responsibilities of teachers, it requires the addition of psychological resilience and technostress concepts to the measurement of the effect of digital literacy on job satisfaction. Distance and online education activities and digital literacy levels of teachers are very important in terms of continuing these activities successfully. Therefore, it is considered that teachers' digital literacy levels can be effective on technostress levels and job satisfaction. Furthermore, in question research is considered important in terms of the findings that technostress can mediate the emergence of job satisfaction, which is known to have a direct effect on the quality of education (Trivellas & Dargenidou, 2009; Kuwaiti et al., 2020), and can raise awareness about the personal development of teachers and the change of teacher training programmes towards the use of technology. In addition, people's stress levels differ even if the stressors are the same. Since it is thought that psychological resilience may have a moderating effect on this (Al-Fudail & Mellar, 2008; Guenzi et al., 2019), the moderating role of psychological resilience in the effect of digital literacy on techno-stress was also examined within the same research model. Within the scope of the research, it will be suggested that testing a model with both mediator and moderator variables will bring originality to the research, and with the findings obtained, it will be suggested that teachers' psychological resilience, which is evaluated to reduce techno-stress levels, should be invested in addition to their digital literacy levels. During the COVID-19 epidemic, teachers' ability to find solutions to a number of problem situations arising from the intensive use of information and communication technologies due to the continuation of distance education has emerged as a very important issue in terms of not being exposed to any stress. It is also known that job satisfaction depends on organizational and individual reasons. In the light of this information, it is obligatory to evaluate the concepts of psychological resilience and technostress together, without ignoring them, in the impact of teachers' digital literacy levels on job satisfaction. At this point, the main purpose of this research is to reveal the mediating effect of technostress on the effect of digital literacy levels on job satisfaction and the moderating effect of psychological resilience on the same model. Teachers have assumed a great responsibility in ensuring that education and training are not interrupted during this period. In this respect, it is considered that the results obtained will guide policy makers.

## Conceptual framework

### Self-determination theory

Self-determination theory relates the concepts of motivation and personality with each other. However, according to this theory, intrinsic motivation and extrinsic motivation can direct human behaviour (Ryan & Deci, 2002). Self-determination theory divides motivation into three types: amotivation, extrinsic motivation and intrinsic motivation and argues that people's motivation is a developmental process that depends on time and space. However, according to this theory, it emphasises that three basic psychological needs, namely the need for competence, the need for autonomy and the need for relationship, are the nutrients of motivation. In this context, it is possible to say that self-determination theory concerns not only the type of motivation but also the conditions that support and sustain motivation (Wen-ying & Xi, 2016:33). However, the inhibition of any of the needs for competence, autonomy and relationship negatively affects both motivation and well-being (Ryan & Deci, 2020).

People with high self-determination tend to have high self-motivation. When faced with a difficult situation, people who believe in themselves feel that they can overcome anything they set their minds to through diligence, good choices and hard work. Therefore, self-determination means acting with a sense of choice, will and commitment and is based on intrinsic motivation and integrated extrinsic motivation (Deci et al., 2017). Self-determination theory argues that motivation can change according to the conditions and therefore it is important to create appropriate conditions for motivating individuals. This theory attaches great importance to intrinsic motivation in individuals and argues that extrinsic motivation can also turn into intrinsic motivation. Self-determination theory emphasises that intrinsic motivation will develop if needs are supported (Deci & Ryan, 2002; Deci et al., 2017; Ryan & Deci, 2002). In terms of performing an activity, extrinsic motivation is driven by needs such as external control, reward and punishment, while intrinsic motivation is a situation that causes voluntary participation in an activity for intrinsic satisfaction. On the other hand, high intrinsic motivation, e.g. interest, curiosity and autonomous forms of self-regulation, is closely associated with better learning, better conceptual understanding, better academic performance, achievement and higher levels of well-being than high extrinsic motivation (ten-Cate et al., 2011: 962). Therefore, according to the self-determination theory, it is possible to say that maintaining the development of individuals in a healthy way is possible by responding to psychological needs. From the perspective of teachers, it

is very important that teachers who feel competent can interact effectively with their environment, have lower stress levels and have the necessary skills for success. In this direction, supporting teachers to meet their autonomy, competence (e.g. digital-literacy) and relationship needs will increase their motivation and psychological resilience and prevent them from being exposed to technostress related to their duties. Therefore, in terms of the relationship between digital literacy and technostress, it is possible to say that meeting teachers' competence, autonomy, relevance and psychological needs will promote autonomous motivation, high quality performance and health.

### Organizational support theory

According to the theory of organizational support put forward by Rhoades and Eisenberger (2002), when employees are provided with the attractive resources they desire, they make more effort towards their jobs. Employees who have a strong perception of organizational support believe that their employers value their work more and will support them very well in the face of difficult situations (Eisenberger et al., 1986). Therefore, according to this theory, if employees are supported in terms of completing their jobs, they perceive the motivational factor underlying this situation and respond with a better performance level. In this respect, it is very important to support digital literacy in terms of competence in the institutions where teachers work and to take measures against technostress in terms of professional pressure.

### Psychological resilience

Psychological resilience is best defined as successfully adapting to stressful situations (Zautra et al., 2010: 4). On the other hand, psychological resilience is a concept that is seen as a process of effectively overcoming undesirable situations and experiences. However, it is also described as a combination of skills that enable overcoming stress. In addition, psychological resilience is associated with flexibility and the capacity to overcome negative situations in some way as well as the capacity to evoke positive emotions (Regin et al., 2016: 2). Although the concept of resilience is considered to be innate, the dimension of resilience is clearly shaped under the influence of individual and environmental factors. When the relevant literature on this concept is examined, it has been determined that the quantitative design studies on psychological resilience for teachers are very limited (Bouillet et al., 2014; Kidger et al., 2016; Kõiv et al., 2019; Ainsworth & Oldfield, 2019). Bouillet et al. (2014) found in their research that teachers who consider themselves more resilient in terms of developing resilience in students are more successful. Kõiv et al. (2019), on the other hand, revealed that the psychological empowerment

of individuals who practice the teaching profession will be achieved by communicating with them in a framework where they can feel that they are valuable within the framework of cooperation.

### Techno-stress

According to Tarafdar et al. (2010: 304–305), technostress is the state of stress experienced by individuals as a result of the uncertainty caused by exposure to too much information due to the uninterrupted use of technological applications and the constant relearning effort. As a result, it can be said that technostress develops due to the use of information communication technologies (Ayyagari et al., 2011; Ragu-Nathan et al., 2008a; Tarafdar et al., 2019). Lei and Ngai (2014: 2), on the other hand, associate the concept of technostress with less time for the individual, working at a high pace and being under a greater amount of workload, and express it as a state of stress due to the intensive use of information and communication technologies that occurs as a result of more physical and mental stimulation of individuals. Techno-load, techno-occupation, techno-determinism and techno-distrust are the dimensions of technostress (Ragu-Nathan et al., 2008b; Tarafadar et al., 2011). Overloading refers to the state of information fatigue due to the fact that the individual is intertwined with more technological information. As a natural consequence of this situation, the individual is exposed to more stress as he/she has to work more. In the techno-invasion dimension, there is a stress situation that arises as a result of staying in constant connection due to being accessible everywhere and at all times, especially due to the progress and development in technology. However, this dimension is also related to the difficulties of adapting oneself to this situation as a result of constant exposure to new technologies. Techno insecurity refers to the stressful situation experienced by employees in case of fear of losing their job in the face of competitors who are more dominant in technology. Techno-complexity, on the other hand, explains the stress experienced by individuals in the event of difficulty due to the effort and fatigue associated with adapting to the use of new applications (Ragu-Nathan et al., 2008b: 3; Tarafadar et al., 2011: 116).

### Digital literacy

Digital literacy is considered as a set of competences and skills that are closely related to each other in order to be successful in the current era (List, 2019: 147). When the issue is looked at more closely in individual terms, it is seen that people's digital literacy levels are closely related to their commitment to their jobs (Chan et al., 2021: 524). On this basis, digital literacy can be defined as the ability to identify, access and manage digital resources, integrate these resources, evaluate,

analyse-synthesise, create new information, and use digital elements correctly to communicate with different people through media (Martin, 2005: 135). In this context, the concept of digital literacy can also be stated as knowing how to access digital information and how to present it through evaluation (Mishra et al., 2017: 205). Ng (2012) argued that digital literacy occurs on the basis of these concepts by looking at the concept of digital literacy from social-emotional, cognitive and technical perspectives. In this context, the technical dimension includes the skill set for the use of digital elements, and the cognitive dimension includes the ability to search for information at the point of accessing information and to analyse-synthesise. In addition, within the scope of cognitive competencies, it also includes the ability to determine the software and programmes that need to be used in order to perform certain tasks. Finally, under the social-emotional dimension, the responsible use of the Internet includes the ability to use it correctly in the context of socialisation (Ng, 2012: 1067–1068).

### Job satisfaction

Job satisfaction refers to the degree to which individuals like or dislike their jobs (Spector, 1997: 2). In this sense, it is possible to say that job satisfaction is very important both individually and organisationally. Because the emotional state of the individual towards his/her job directly affects both the individual himself/herself and the organisation under his/her roof (Malinen & Savolainen, 2016: 145). Herzberg et al. (1959) and Herzberg (1966), revealed the factors that reveal satisfaction and dissatisfaction regarding job satisfaction. In this context, intrinsic factors such as being successful and carrying responsibility support the emergence of job satisfaction. On the contrary, external factors such as low wages and unfavourable working conditions may result in job dissatisfaction (Oshagbemi, 1997: 354). On the other hand, there are two important factors affecting job satisfaction. The first one is the individual structure, feelings and thoughts that cover the psychological and physical needs of the individual. The second factor is similarly related to the extent to which the psychological and physical opportunities for work meet the needs of the individual (Kok, 2006: 193). From the perspective of teachers, when the issue is considered from the teachers' point of view, job satisfaction can be expressed as the feeling of satisfaction that teachers experience because of the work they do for their profession (Ainley & Carstens, 2018: 43).

## Hypothesis development

### Digital literacy-technostress-satisfaction

Studies on stress in the literature have revealed that high stress levels are associated with low job satisfaction in different

occupational groups (Guenzi et al., 2019; Tuten & Neidermeyer, 2004; Williams et al., 2001). On the other hand, it has been revealed in the literature research that teachers' satisfaction with their job positively affects their performance (Weiqi, 2007; Zembylas & Papanastasiou, 2004). However, it is seen that studies on the factors affecting teachers' job satisfaction focus on teachers' attitudes towards the profession (Antoniou et al., 2016; Kavitha & Venkateswaran, 2015; Gun, 2012) teacher self-efficacy (Klassen & Chiu, 2010; Skaalvik & Skaalvik, 2017) student achievement (Banerjee et al., 2017; Dicke et al., 2020). In their research, Klassen and Chiu (2010), found that teachers who have richer teaching strategies have more job satisfaction. In this study, student engagement, classroom management and teaching strategies were emphasised as areas of teacher self-efficacy. In addition, productivity and stress concepts and job satisfaction levels of individuals within the scope of their professional lives are directly or indirectly closely related (Chye Koh & Boo, 2004; Bouwkamp-Memmer et al., 2013). In addition, it has been determined in the literature that job satisfaction is under the influence of job stress (Fairbrother & Warn, 2003; Mansoor et al., 2011). The COVID-19 pandemic has clearly revealed the necessity for teachers to have richer teaching strategies. On the other hand, it is important to emphasise that job satisfaction has received great attention in academic studies on teachers, but the relationship between job satisfaction and digital literacy has not been addressed in detail. The fact that teachers see themselves as sufficient for the software and hardware they use within the scope of online education and believe that they can overcome these problems in case of any problems will increase their self-confidence and thus contribute to the reduction of stress caused by more exposure to technology. It is believed that this will positively affect job satisfaction.

Stress is the effort that the individual exerts beyond his/her physical and psychological limits towards the incompatible conditions in his/her physical and social environment (Cüceloğlu, 1994: 321). Based on this definition, the perception of inadequacy in the use of equipment used due to online training will cause stress. According to the need for success theory put forward by McClelland (1961), for job satisfaction, although individuals want to be successful in their lives, they may hold back from activities that can achieve success by fearing failure. Concepts such as media literacy, information communication technologies literacy, technology literacy and information literacy can be associated with digital literacy. Because all of these concepts have emerged with the emergence and increasing development of digital technologies (Pacheco & Coello-Montecel, 2023: 2). Digital technologies directly affect the competencies that employees need to develop to achieve organisational goals (Colbert et al., 2016). In this context, the positive effects of digital competence on academic performance have been revealed in studies (Mohammadyari & Singh, 2015;

Mehrvarz et al., 2021). However, information literacy and digital skills have positive effects on the adoption of information communication technologies by improving technostress (Yu et al., 2017: 196). Therefore, it is necessary to determine the mediating role of technostress in the relationship between digital literacy levels and job satisfaction, which will contribute to the success of teachers. Based on the empirical research results, the  $H_1$  hypothesis testing the mediation model is designed as follows:

**$H_1$ :** Digital literacy positively affects job satisfaction indirectly through technostress.

### Digital literacy-psychological resilience-technostress

Especially the occurrence of uncertainties in many issues becomes a stress factor for individuals. In the researches, the importance of psychological resilience in coping with stress has been emphasised (Calvete et al., 2022; Paul et al., 2022). Due to the closure of schools, online courses have started to be held, which has led to the emergence of different stress factors. With the predominance of online courses, this situation necessitates the examination of the concept of technostress in terms of teachers. Jena (2015), in his research on academics, addressed the technostress that occurs within the scope of information and communication technologies supported collaborative learning activities. According to the research results, technostress is negatively related to job satisfaction and job performance. Similarly, Al-Fudail and Mellar (2008), in their research on teachers, found that technostress has a number of negative physical and psychological effects. Selye (1977), in his general adaptation syndrome theory, emphasised that there are three phases of stress: alarm, resistance and exhaustion. In the first stage, the state of realisation of stress, in the second stage, the state of resistance to stress, and in the last stage, if stress cannot be resisted, exhaustion occurs. According to the self-determination theory, meeting the basic psychological needs of employees within the scope of competence, autonomy and relevance promotes autonomous motivation, high quality performance and health. In addition, these variables, which can often be seen as antecedents of job satisfaction, are also effective on job satisfaction (Deci et al., 2017: 25). In studies conducted with these variables, it has been determined that satisfaction at the level of competence, autonomy and relevance leads to less burnout (Andreassen et al., 2010). On the other hand, it has been revealed in the relevant literature that autonomous motivation prevents feelings of burnout (Roth et al., 2007; Fernet et al., 2008; Van den Berghe et al., 2013; Van den Berghe et al., 2014). However, according to the results of the study conducted by Abós et al. (2018) teachers with high autonomous motivation, who enjoy

teaching and value their work more, are less likely to show signs of exhaustion and show more commitment to their work. According to the psychological resilience and meta theory put forward by Richardson (2002), the individual's ability to adapt to the negativities, problem situations and stressful events in life is realised through the individual's psychological resilience. Psychological resilience is seen as an important factor for success in coping with stress (Connor & Davidson, 2003: 77). In this context, in the light of the researches conducted and the empirical results obtained, hypothesis  $H_2$  is designed as follows:

**$H_2$ :** Psychological resilience has a moderating effect on the effect of digital literacy technostress.

### Digital literacy-psychological resilience-technostress-satisfaction

The concepts of stress and job satisfaction can be considered as indicators for teachers to fulfil the tasks expected of them professionally (Troesch & Bauer, 2017: 389). On the other hand, with the adequate use of technology, it will be easier for people to live together with technology and reach new goals, thus increasing performance and enabling new technologies to be used more quickly (Salazar-Concha et al., 2021: 2). In addition, it is known that information technologies positively affect the job performance of employees (Deng et al., 2022). However, it is not possible to consider the change in the basic parameters of working conditions and the jobs performed in the labour market separately from the concept of digitalisation. To put it more clearly, while the emerging opportunities and risks have an impact on working conditions on the one hand, on the other hand, the need for digitally competent highly skilled employees who can adapt to the transformation in question has increased much more (Bejakovic & Mrnjavac, 2020: 921). In this context, the concept of technostress is accepted as a negative effect that may occur on technology-induced thinking, behaviour, attitude or human psychology (Weil & Rosen, 1997: 36). In order to overcome these negative situations arising from the greater adoption of online learning in the COVID-19 pandemic, individuals need to be more skilful in digital literacy and technology predisposition. (Purnama et al., 2021: 2). This situation required teachers to perform more and clearly revealed the importance of teachers' psychological resilience. In addition, it is seen that the factors affecting resilience in teachers are identified as support from colleagues (O'Sullivan, 2006), relationships with management (Cameron & Lovett, 2015), school culture (Peters & Pearce, 2012) and intrinsic motivation (Kitching et al., 2009). Similarly, Johnson et al. (2014) listed the factors affecting teachers' resilience as work, teacher identity,

relationships, school culture, and policies and practices. Fredrickson (2001), argued that psychological resilience is effective on psychological well-being. Another study that supports these findings was conducted by Ryff and Singer (2003), who found that resilient individuals are better able to maintain their psychological and physical health and recover more quickly from stressful situations. According to Herzberg et al. (1959), Herzberg's (1966), dual factor theory, an individual's success in his/her job and job satisfaction are directly proportional.

Job satisfaction is affected by organisational and individual factors for employees. Meeting the expectations of employees, meeting the expectations at the advanced level in line with their academic background can positively affect job satisfaction (Chang & Lee, 2007: 157). Asgari et al. (2020) found that job satisfaction mediates the relationship between transformational and transactional leadership and employees' organisational citizenship behaviour in their research on the relationship between organisational support and employees' organisational citizenship behaviour and job satisfaction. Similarly, Bernarto et al. (2020) concluded that organisational support has a positive effect on job satisfaction and life satisfaction. At the same time, job satisfaction has a positive effect on life satisfaction. Bogler and Nir (2012), in their research, found that professional development is a significant predictor of job satisfaction. According to the results of the research conducted by Ingusci et al. (2016) the concept of job resourcefulness, which is considered as a proactive work behaviour that represents adapting their work according to their needs, skills and preferences, is closely related to job satisfaction. On the other hand, digital literacy has become a very important competence for teachers to be successful both in the classroom environment and individually (Gasaymeh et al., 2017; Svensson & Baelo, 2015).

In terms of teachers, digital literacy is a very important factor to be successful especially in the current century. In addition (Lazarus & Folkman 1984), according to the cognitive-transactional theory, a positive or negative interpretation of stress occurs in the mind of an individual who encounters a negative situation. Therefore, the meaning that the individual attributes to the situation is at the forefront. On the other hand, according to psychological resilience and meta theory (Richardson, 2002), psychological resilience is considered as a key to overcome stressful situations in human life. Therefore, psychologically resilient individuals can cope better with negative situations such as stress and difficulties in the face of any event. In this context, it is possible to say that psychological resilience is effective on all these relationships. Based on the researches conducted and the theoretical information obtained, hypothesis H3 is designed as follows:

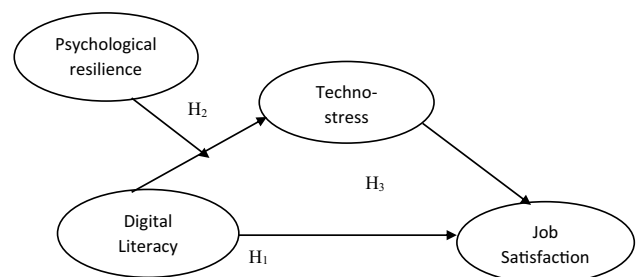
**H<sub>3</sub>:** Psychological resilience has a moderating effect on the indirect effect of digital literacy on job satisfaction through technostress.

## Method

The main purpose of the present study is to determine the mediating effect of technostress and the moderating effect of psychological resilience on the effect of digital literacy on job satisfaction within the scope of causal screening model. In this direction, firstly, the model used in the research, purpose and importance, population-sample information and explanations about the scales were given. In this context, the scales within the scope of the research were subjected to exploratory and confirmatory factor analysis and correlation values between factors were calculated. Then, the research model was tested with the impact analyses and the values obtained were presented in detail. The model and research hypotheses formed within the scope of the research are shown in Fig. 1.

## Participants and procedure

In the 2020–2021 academic year, the number of teachers working in public schools affiliated to the Ministry of National Education is 1,112,335. Accordingly, this number was taken into consideration in determining the sampling frame (Ministry of National Education). Accordingly, taking into account the % 5 margin of error from the main mass, the sample size was calculated as 384 people within % 95 reliability limits. In order to collect the research data, the questionnaire form, which was created within the scope of the necessary permissions obtained from the Ministry of National Education, was sent to more than six thousand teachers via e-mail and message between November 2021 and June 2022 with the convenience sampling method. Analyses were carried out on the questionnaire forms sent by 403 teachers who returned. Out of 403 participants, % 45, 4 ( $n = 183$ ) were female and % 54, 6 ( $n = 220$ ) were male. Of the teachers participating in the study, % 2.7% ( $n = 11$ )



**Fig. 1** Research model and hypotheses

were between the ages of 20–25, % 20.1 ( $n=81$ ) between the ages of 26–35, % 38.0 ( $n=153$ ) between the ages of 36–45 and % 39.2 ( $n=158$ ) 46 and over. In addition, % 29,3 ( $n=118$ ) of the teachers participating in the study work in primary schools, % 16,1 ( $n=65$ ) in secondary schools, % 44,4 ( $n=179$ ) in high schools and % 10,2 ( $n=41$ ) in schools at other levels. In addition, % 1, ( $n=7$ ) of the teachers participating in the study have associate degree, % 70,2 ( $n=283$ ) have bachelor's degree, % 28 ( $n=113$ ) have postgraduate degree.

## Data collection

In this research, which was carried out to determine the mediating effect of technostress in the effect of digital literacy on job satisfaction, questionnaire technique was used to collect data. In the first part of the questionnaire form, there are six statements about demographic information, four statements about psychological resilience in the second part, five statements about job satisfaction in the third part, ten statements about digital literacy in the fourth part, and fourteen statements about technostress in the fifth and last part. In addition, reliability and validity information regarding the research scales used for measurement are as follows:

**Digital literacy scale** The independent variable of this present study is teachers' digital literacy level. In this context, to measure this variable, a digital literacy scale designed by Ng (2012) was used. *Turkish adaptation of this scale was carried out by Üstündağ et al.* Accordingly, it was determined that the one-factor structure reached in the factor analysis of the digital literacy scale consisting of ten statements explained about %40 of the total variance. In addition, the reliability coefficient for the scale was determined as Cronbach Alpha 0.86.

Before the data obtained for the digital literacy scale were subjected to exploratory and confirmatory factor analysis, linearity and normality tests were performed to determine the construct validity of the scale in question. If the kurtosis and skewness values are between +2 and -2 or +3 and -3, it is accepted that the data set is normally distributed. (George & Mallery, 2003; Kalaycı, 2010). It was seen that the kurtosis and skewness (Kurtosis: 1,093 Skewness: -,603) values of the scale in question met the condition of being between +2 and -2. Afterwards, whether the scale fulfils the conditions of multivariate normal distribution was tested by means of KMO and Bartlett tests. The KMO value  $a = ,928$  and Bartlett's test results ( $\chi^2: 2187,981$  dd: 36  $p: 0,000$   $p < 0,05$ ) were calculated and it was determined that the scale met the linearity criteria. In the exploratory factor analysis, it was found that the one-factor structure with factor loads ranging between,617 and,844 explained % 60,982 of the total

variance. Moreover, the scale's Cronbach's alpha coefficient was found to be 0.919. The confirmatory factor analyses results and goodness of fit values are shown in Table 1.

**Job satisfaction scale** Within the scope of the research, teachers' job satisfaction was accepted as the dependent variable. This variable was measured by means of the job satisfaction scale originally developed by Judge et al. (1998) and adapted into Turkish by Keser and Bilir (2019). The scale, which has a one-factor structure consisting mainly of a total of five statements, was found to explain % 62 total variance. In addition, the reliability Coefficient was found to be Cronbach Alpha 0.85.

Before the data obtained regarding the job satisfaction scale were subjected to exploratory and confirmatory factor analysis, linearity and normality tests were performed to determine the construct validity of the scale in question. If the kurtosis and skewness values are between +2 and -2 or +3 and -3, it is accepted that the data set is normally distributed (George & Mallery, 2003; Kalaycı, 2010). It

**Table 1** Goodness of fit values for confirmatory factor analysis

Scale	1st Level	2st Level
Techno-stress		
CMIN/DF	2,219	2,219
CFI	,959	,959
GFI	,945	,945
AGFI	,921	,921
RMSEA	,055	,055
Digital Literacy		
CMIN/DF	2,811	
CFI	,979	
GFI	,963	
AGFI	,933	
RMSEA	,067	
Job Satisfaction		
CMIN/DF	,744	
CFI	,999	
GFI	,996	
AGFI	,989	
RMSEA	0,00	
Psychological Resilience		
CMIN/DF	,063	
CFI	,999	
GFI	,996	
AGFI	,979	
RMSEA	0,000	
Acceptable Fit		
CMIN/DF: <3–5	GFI: >,85	AGFI: >,80
CFI: >,85	RMSEA: <,08	
Good Fit		
CMIN/DF: <3	GFI: >,90	AGFI: >,80
CFI: >,95	RMSEA: <,05	

was seen that the kurtosis and skewness (Kurtosis: 3,01 Skewness: ,146) values of the scale in question met the normal distribution conditions. Afterwards, whether the scale meets the conditions of multivariate normal distribution was tested by means of KMO and Bartlett tests. The KMO value  $\alpha = ,827$  and Bartlett's test results ( $\chi^2$ : 1027,750  $df$ : 10  $p$ : 0,000  $p < 0,05$ ) were calculated and found out that the scale provided the linearity criteria. In the exploratory factor analysis, it was determined that the one-factor structure with factor loads ranging between ,546 and ,894 explained % 64,128 of the total variance. Moreover, the scale's Cronbach's alpha coefficient was found to be 0.511. Confirmatory factor analysis results and goodness of fit values are shown in Table 1.

**Technostress scale** Technostress constitutes the mediating variable of this research. In this context, the technostress scale developed by Tarafdar et al. (2007) and simplified by Alam (2016) was used to measure this variable. The Turkish adaptation of the scale was carried out by Turen et al. (2015). Accordingly, it was determined that the three-factor structure reached in the factor analysis for the technostress scale consisting of fourteen statements explained % 66 variance in total. In addition, the reliability of the scale was calculated to be Cronbach Alpha 0.92.

Before the data obtained regarding the technostress scale were subjected to exploratory and confirmatory factor analysis, linearity and normality tests were performed to determine the construct validity of the scale in question. If the kurtosis and skewness values are between +2 and -2 or +3 and -3, it is accepted that the data set is normally distributed (George & Mallery, 2003; Kalaycı, 2010). The kurtosis and skewness (Kurtosis: ,540 / Skewness: ,961) values of the scale in question were found to meet the normal distribution condition. Afterwards, whether the scale fulfils the multivariate normal distribution conditions was tested by means of KMO and Bartlett tests. The KMO value  $\alpha = ,848$  and Bartlett's test results ( $\chi^2$ : 2238,917  $df$ : 91  $p$ : 0,000  $p < 0,05$ ) were calculated and it was found out that the scale provided the linearity criteria. In the exploratory factor analysis, it was determined that the one-factor structure with factor loadings ranging between ,621 and ,876 explained % 61,072 of the total variance. Moreover, the scale's Cronbach's alpha coefficient was found to be 0.829. Confirmatory factor analysis results and goodness of fit values are shown in Table 1.

**Psychological resilience scale** The regulatory variable of this research is psychological resilience. The psychological resilience scale developed by Sinclair and Wallston (2004), was used to measure this variable. Although this scale has a single factor structure, the reliability coefficient Cronbach Alpha was calculated as 0.69.

Before the data obtained regarding the psychological resilience scale were subjected to exploratory and confirmatory factor analysis, linearity and normality tests were performed to determine the construct validity of the scale in question. If the kurtosis and skewness values are between +2 and -2 or +3 and -3, it is accepted that the data set is normally distributed (George & Mallery, 2003; Kalaycı, 2010). The kurtosis and skewness (Kurtosis: 2,80 / Skewness: -1,06) values of the scale in question were found to meet the normal distribution condition. Afterwards, whether the scale meets the conditions of multivariate normal distribution was tested by means of KMO and Bartlett tests. The KMO value  $\alpha = 0.757$  and Bartlett's test results ( $\chi^2$ : 405, 87  $df$ : 6  $p$ : 0.000  $p < 0.05$ ) were calculated and it was found out that the scale provided the linearity criteria. In the exploratory factor analysis, it was determined that the one-factor structure with factor loadings ranging between 0.731 and 0.852 explained % 58.923 of the total variance. Moreover, the scale's Cronbach's alpha coefficient was found to be 0.763. The results of confirmatory factor analysis and goodness of fit values are shown in Table 1.

## Findings

The analysis of the data obtained within the scope of the research was carried out through SPSS 23 and AMOS 23 package programmes. In this context, this section includes demographic findings, correlation analysis and situational mediation effect analysis.

### Correlation analysis

The arithmetic mean standard deviation and correlation values between the factors within the scope of the research are shown in Table 2.

The factors related to the variables in the study and the relationships between these factors are generally significant in positive and negative directions at  $p < 0.01$  level. The results obtained are shown in Table 2. Cronbach Alpha reliability coefficient for the factors is shown in brackets. On the other hand, AVE and CR values were calculated to determine whether the factors within the scope of the research have convergent validity. If  $AVE > 0.5$   $CR >$  and  $CR > AVE$ , the conditions for the combination validity of the factors are met (Gurbuz, 2019: 80). In this context, it is seen that the combination validity is provided with the calculated values. These values are shown in Table 3.

### Situational mediation effect analyses

If the indirect effect of the independent variable on the dependent variable through the mediating variable depends

**Table 2** Arithmetical means, standards of deviation and the correlation values of the factors

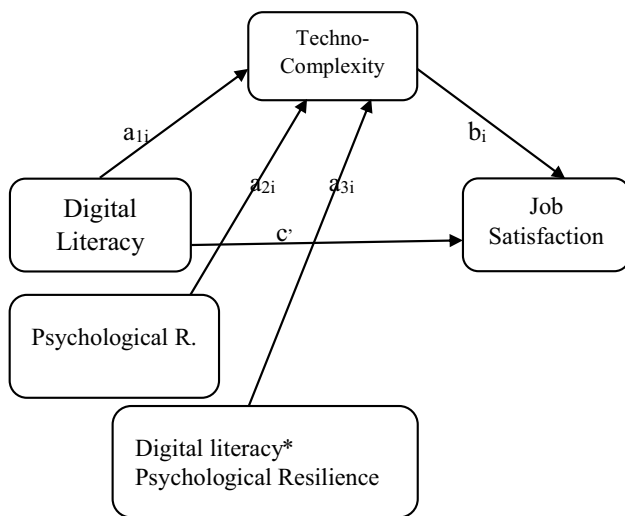
Variable	M	Sd	1	2	3	4	5	6
1. Psychological R	4,07	,62	(,76)					
2. Job S	3,22	,42	,349**	(,51)				
3.Digital L	3,72	,68	,493**	,275**	(,91)			
4.Techno-Workload	3,08	,73	-.032**	,034	-.090	(,78)		
5.Techno-Complexity	2,60	,79	-,100*	,064	-,425**	,160**	(,82)	
6.Techno-Uncertainty	2,86	,80	,255**	,257**	,207**	,147**	,201**	(,83)

**Table 3** AVE and CR values for convergent validity

Variable	AVE	CR
1. Psychological R	0,46	,77
2. Job S	0,57	,74
3.Digital L	0,55	,91
4.Techno-Workload	0,45	,79
5.Techno-Complexity	0,50	,83
6.Techno-Uncertainty	0,57	,83

on the regulatory variable, the situational mediation effect emerges (Gurbuz, 2019: 117). For the measurement of this effect, 5000 resampling option was preferred with the Bootstrap technique. In Bootstrap analysis, whether there is a mediation effect or indirect effect is decided by looking at the CI value in the 95% confidence interval. In this direction, if the lower and upper limits of the confidence interval do not cover the value of 0, the indirect effect is considered to be significant. The situational mediation model created in this context is shown in Fig. 2.

In order to statistically test the research model shown in Fig. 2, firstly, the mediating role of technostress in the effect of digital literacy on job satisfaction within the scope



**Fig. 2** Situational mediation model tested in the study

**Table 4** Mediating effect of techno-uncertainty factor in the relationship between digital literacy and job satisfaction

	Techno-Uncertainty		Job Satisfaction	
	β	SE	β	SE
Digital Literacy (c)			,168***	,029
R <sup>2</sup>			,075	
Digital Literacy (a)	-,243***	,057		
R <sup>2</sup>	,042			
Digital Literacy (c')			,142***	,029
Techno-Uncertainty (b)			,109***	,025
R <sup>2</sup>			,117	
Indirect Effect			0,026***	
			(0,0096—0,0490)	

\*\*\* < 0.001, \* < 0,005

of hypothesis H<sub>1</sub> was tested. Secondly, in line with H<sub>2</sub>, the moderating effect of psychological resilience on the effect of digital literacy on technostress was examined. Finally, in line with H<sub>3</sub>, the situational mediation model was completed with the analyses made through the SPSS Process macro. The results obtained in line with hypothesis H<sub>1</sub> are shown in Tables 4 and 5 in terms of factors.

According to the table, the total effect of digital literacy on job satisfaction is statistically significant (β = ,168

**Table 5** Mediating effect of techno-complexity factor in the relationship between digital literacy and job satisfaction

	Techno-Complexity		Job Satisfaction	
	β	SE	β	SE
Digital Literacy (c)			,168***	,029
R <sup>2</sup>			,075	
Digital Literacy (a)	-,494***	,052		
R <sup>2</sup>	,180			
Digital Literacy (c')			,226***	,032
Techno-Complexity (b)			,116***	,027
R <sup>2</sup>			,115	
Indirect Effect			-0,057***	
			(-,0967/ -,0250)	

\*\*\* < 0.001, \* < 0,005

$p < 0.001$ ). However, the analyses revealed a positive path coefficient between digital literacy and technouncertainty factor ( $\beta = .243$   $p < 0.001$ ). On the other hand, the indirect effect between digital literacy and job satisfaction was calculated as 0.026 and 0.0096–0.0490 in the % 95 confidence interval and it was determined that the indirect effect was statistically significant since this interval value did not contain zero. Table 5 shows the data on the mediation effect of techno-complexity factor.

According to Table 5, the total effect of digital literacy on job satisfaction is statistically significant ( $\beta = .168$   $p < 0.001$ ). However, the analyses revealed a negative path coefficient between digital literacy and techno-complexity factor ( $\beta = -.494$   $p < 0.001$ ). On the other hand, the indirect effect between digital literacy and job satisfaction was calculated as -0.057 and -0.0967 / -0.0250 in the 95% confidence interval and it was determined that the indirect effect was statistically significant since this interval value does not contain zero.

Within the scope of the research, the moderating impact of psychological resilience upon the impact of digital literacy over technostress in line with  $H_2$  was analysed and the results obtained in terms of techno-complexity factor are shown in Table 6.

According to Table 6, in the moderating effect analysis conducted with the bootstrapping technique, it was seen that all prediction variables included in the analysis explained approximately 23% of the effect on job satisfaction ( $R^2 = .225$ ). In addition, the interactional effect (moderating effect) of digital literacy and psychological resilience variables on job satisfaction was found to be significant ( $\beta = -.190$   $p < 0.001$ ). The moderating effect of techno-workload factor in the relationship between digital literacy and job satisfaction is shown in Table 7.

According to Table 7, in the moderating effect analysis conducted with the bootstrapping technique, it was seen that all prediction variables included in the analysis explained approximately 29% of the effect on job satisfaction ( $R^2 = .290$ ). In addition, the interactional effect (moderating effect) of digital literacy and psychological resilience variables on job satisfaction was found to be significant ( $\beta = -.117$   $p < 0.001$ ).

**Table 6** Load values for the regulatory effect of techno-complexity

Variable	$\beta$	SE	t
Constant	1,500*	,692	2,166
Digital Literacy (X)	,174	,203	,861
Psychological Resilience (W)	,833***	,179	4,64
X*W	-,190***	,049	-3,87
	[-,287 / -,094]		

\*\*\*  $< 0.001$ , \*  $< 0,005$

**Table 7** Load values for the regulatory effect of techno-workload

Variable	$\beta$	SE	t
Constant	1,62*	,709	2,283
Digital Literacy (X)	,313	,207	1,509
Psychological Resilience (W)	,516*	,183	2,81
X*W	-,117*	,050	-2,32
	[-,216 / -,018]		

\*\*\*  $< 0.001$ , \*  $< 0,005$

The results of the analysis conducted to determine the moderating impact of technostress on the relationship between digital literacy and job satisfaction within the scope of testing hypothesis  $H_3$  are shown in Table 8.

According to Table 8, the indirect effect of digital literacy on job satisfaction through psychological resilience is significant for -1 standard deviation ( $B = -.057$   $Sh = .019$ %95 BCa CI [-,099/-,024]) mean ( $B = -.068$   $Sh = .021$ %95 BCa CI [-,114/-,029]) + 1 standard deviation ( $B = -.085$   $Sh = .026$ %95 BCa CI [-,141/-,036]) values. The indirect effect between the three different levels of the psychological resilience variable is significant. Similarly, the direct effect of digital literacy on job satisfaction is significant for -1 standard deviation ( $B = -0.493$   $Sh = 0.062$ %95 BCa CI [-0.616/-0.370]) mean ( $B = -0.588$   $Sh = 0.058$ %95 BCa CI [-0.704/-0.473]) + 1 standard deviation ( $B = -0.732$   $Sh = 0.071$ %95 BCa CI [-0.871/-0.592]) values. Therefore, psychological resilience moderates both the direct relationship between job satisfaction and digital literacy and the indirect relationship between digital literacy and job satisfaction through techno-complexity (See Fig. 3).

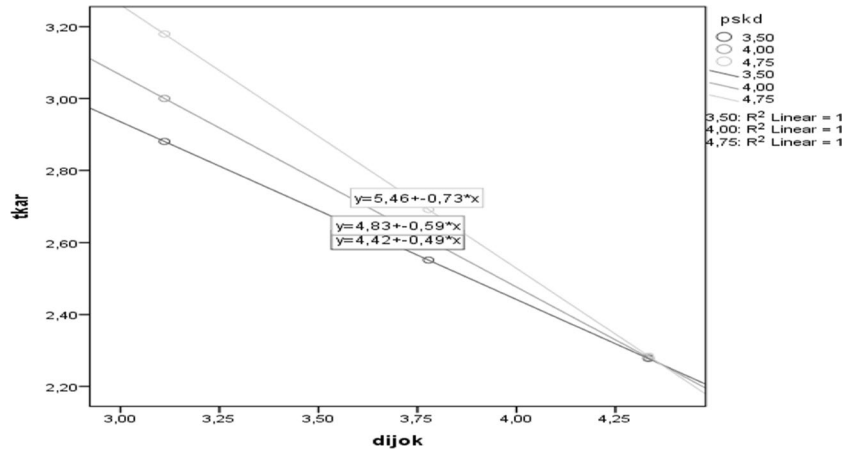
## Conclusion and discussion

In this study, which was conducted to determine the mediating impact of technostress on the effect of digital literacy on the job satisfaction and the mediating impact of psychological resilience within the impact of digital literacy on job satisfaction, firstly, the mediating role of technostress in the effect of digital literacy to job satisfaction is tested. After this stage, the moderating impact of psychological resilience in the effect that digital literacy has on technostress was tested and finally, situational mediation tests were carried out. According to the results obtained in this direction, the technostress factors namely techno-complexity and techno-determinism play a mediating role in the effect of digital literacy on job satisfaction. In addition to this result, psychological resilience has a moderating impact on the influence of digital literacy on technostress. Finally, according to the contingency mediation test where the mediating effect of technostress and the moderator influence played by

**Table 8** Regulatory effect of techno-complexity mediating psychological resilience in the relationship between digital literacy and job satisfaction

Techno-Complexity					
	$\beta$	Se	t	p	
Constant	1,500	,692	2,166	,030	
Digital Literacy (X)	,174	,203	,861	,389	
Psychological Resilience (W)	,833	,179	4,64	,000	
(X)*(W)	-,190	,049	-3,87	,000	
R <sup>2</sup>	,225				
Job Satisfaction					
	$\beta$	Se	t	p	
Constant	2,07	,164	12,65	,000	
Digital Literacy	,226	,032	7,091	,000	
Techno-Complexity	,116	,027	4,24	,000	
R <sup>2</sup>	,115				
Psychological Resilience Direct Effect					
	Effect	Se	t	p	%95BCa GA
-1	-,493	,062	-7,86	,000	-,616/-,370
Middle	-,588	,058	-9,99	,000	-,704/-,473
+1	-,732	,071	-10,29	,000	-,871/-,592
Psychological Resilience Indirect Effect					
	Effect	Se	t	p	%95BCa GA
-1	-,057	,019	-,099/-,024		
Middle	-,068	,021	-,114/-,029		
+1	-,085	,026	-,141/-,036		

**Fig. 3** Situational mediation index graph



psychological resilience on the effect of digital literacy to job satisfaction were tested, significant evidence supporting hypothesis H<sub>3</sub> was found.

According to the findings results from the analyses carried out within the scope of this study, digital literacy has meaningful and positive impact, whereas technostress has meaningful and negative impact. These results support the studies conducted by Chye Koh and Boo (2004) and Bouwkamp-Memmer et al. (2013). According to the results of these studies, performance and productivity concepts are linked to job satisfaction. This is in line with the results of the findings of the studies carried out by Fairbrother and Warn (2003) and Mansoor et al. In these studies, it was revealed that job satisfaction is affected by occupational stress. However, another important result of the

study is that the indirect impact of technostress in the relationship between digital literacy with job satisfaction is negative. This result supports the results of the study conducted by Jena (2015), on academicians' ICT-supported collaborative learning environments. Similarly, in their study on teachers, Al-Fudail and Mellar (2008), found out that the concept of technostress has many negative physical and psychological effects.

The results of the analyses indicated that the negative effect of digital literacy over technostress was higher in teachers with high psychological resilience. On the contrary, the negative effect of digital literacy on technostress is lower in teachers with low psychological resilience. This is due to the negative impact of psychological resilience over stress (Li & Hasson, 2020; Kapoor et al., 2021; Van Rens

& Heritage, 2021; Labrague, 2021). In addition, psychological resilience is considered to be quite significant for combating stress (Connor & Davidson, 2003: 77). However, research results show that the positive implicit impact on job satisfaction of digital literacy is higher for individuals with high resilience. These findings support the research results of Ryff and Singer (2003), which revealed that individuals who are psychologically resilient are also more physically healthy.

Digital literacy is very important for teachers to be successful both in the classroom and individually (Gasaymeh et al., 2017; Svensson & Baelo, 2015). In addition, a high level of digital literacy enables employees to take a more active role and can contribute to overcoming difficulties such as language and distance (Pacheco & Coello-Montecel, 2023:4). In addition, Nicklin et al., (2016) found that organisational support is significantly positively related to job satisfaction and performance and negatively related to stress. On the other hand, Pacheco and Coello-Montecel (2023), concluded in their research that digital competencies increase job performance and provide psychological empowerment of employees. In addition, the results also show that psychological empowerment mediates the relationship between digital competencies and job performance. From this point of view, it is possible to say that competencies such as digital literacy are very important for achieving success both individually and organisationally.

High levels of technostress can reduce employees' productivity towards their tasks (Ho-jin & Cho, 2016). The job performance and productivity of teachers who can cope with technostress are positively affected (Effiyanti & Sagala, 2018). However, providing support for teachers in the use of technology reduces technostress (Al-Fudail & Mellar, 2008; Ragu-Nathan et al., 2008a). Studies have revealed the negative effects of technostress on productivity, performance and turnover (Tu et al., 2005; Rajput et al., 2011; Saganuwan et al., 2013; Fuglseth & Sørebo, 2014). In addition, it has been concluded that individuals with high job satisfaction perform more and have higher productivity (Yoon & Suh, 2003). In addition to all these results, technostress and digital burnout have cognitive, psychological and physiological effects on individuals (Yigit et al., 2021). In the literature on psychological resilience, it has been concluded that individuals with high resilience have high job and life satisfaction (Youssef & Luthans, 2007; Smith & Hollinger-Smith, 2015). All these results reveal that technostress and psychological resilience have direct or indirect effects on job satisfaction through concepts such as productivity, performance, competence and burnout. In this direction, as supported by the results obtained in the research and previous literature, conducting quantitative research on different organisations in which technostress, psychological resilience and digital literacy are accepted as predictors of job satisfaction will contribute

to the development of the literature on the subject. In this context, it is of great importance in terms of individual and organisational performance to increase the psychological resilience of employees in order to both support employees to cope with the negative effects of technostress and to determine specific measures for technostress.

## Limitations and suggestions

In this study, it was determined that techno-determinism and techno-complexity played a mediator effect on the impact of digital literacy over technostress. However, according to the results, psychological resilience also has a moderating impact on the effect of digital literacy on technostress. Although the research hypotheses were accepted within the scope of the results obtained, this study has some limitations. In this context, firstly, the results obtained due to the use of convenience sampling within the framework of the research do not cover all teachers. Secondly, the research was conducted on teachers working in public schools. Based on the results of the research, it is recommended that public authorities should organise training programmes to improve the digital literacy levels of teachers, taking into account the possibility of epidemics such as COVID-19 in the coming years. However, it is believed that physical sociological and psychological studies should be carried out to strengthen the psychological resilience of teachers due to the regulatory effect of psychological resilience, which is the key variable of the study, in the relationship between variables. In this context, it is considered that education systems with more psychologically resilient teachers will have a more advantageous position in overcoming difficult situations. On the other hand, with the COVID-19 pandemic, the importance of digital literacy in terms of teachers' individual and professional lives has increased even more. In this context, teachers should be ensured to participate in training programmes that will support their digital literacy levels, and teachers should be subjected to tests or exams that measure their digital literacy levels before starting work in order to prevent interruption of education, considering that digital education environments will become more important in the following process. For future research, it is recommended that the model put forward within the scope of the research be tested on academicians. In addition, it is recommended that researchers conduct in-depth studies that reveal the elements of teachers' psychological resilience.

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**Author contributions** The authors contributed equally to the research.

**Data availability** The datasets generated during and/or analysed during the current study are not publicly available due [teachers working in public institutions] but are available from the corresponding author on reasonable request.

## Declarations

**Conflict interest** There is no conflict of interest between the researchers.

**Ethics committee permission** This research was carried out in accordance with the ethics committee permission of Hasan Kalyoncu University dated 08.10.2021 and numbered E-97105791-050.01.01-3132. Official documents will be sent immediately upon request.

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