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Research Article

Adaptation of Metacognitive Awareness Inventory for Teachers (MAIT) to Turkish: A Validity-Reliability Study[a]

Abstract

This study aims to adapt the Metacognitive Awareness Inventory for Teachers (MAIT) into Turkish and examine its psychometric properties. The inventory serves the purpose of measuring teachers' metacognitive awareness of their instructional processes. It consists of 24 items and six factors. In the adaptation process, comprehensive validation measures were employed, containing assessments of linguistic equivalence, conceptual and experiential equivalence, and construct validity. Confirmatory Factor Analysis (CFA) was utilized for assessing construct validity. The CFA results showed that the Turkish version of the MAIT demonstrated excellent fit on the SRMR index and acceptable fit values on other indices. Internal validity was examined through the correlation between the inventory and each sub-factor. Within the realibility studies, the analyses ascertained a McDonald's ω value of .94. As a result, it was revealed that the MAIT Turkish form stands as a valid and reliable measurement instrument for assessing teachers' metacognitive awareness in instruction.
Keywords: Metacognitive awareness inventory, inventory adaptation, validity and reliability, teachers

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Araştırma Makalesi

Öğretmenler için Bilişsel Farkındalık Envanteri'nin (ÖBFE) Türkçeye Uyarlanması: Bir Geçerlilik-Güvenilirlik Çalışması[b]

Öz

Bu araştırmanın amacı, Metacognitive Awareness Inventory for Teacher (MAIT) adlı envanteri Türkçeye uyarlamak ve psikometrik özelliklerini incelemektir. Envanter, öğretmenlerin kendi öğretimsel süreçlerine ilişkin bilişsel farkındalıklarını ölçme amacına hizmet etmektedir. 24 madde ve altı faktörden oluşan bu envanterin Türkçeye uyarlanma sürecinde; dil geçerliği, kavramsal ve deneyimsel eşdeğerlik, yapı geçerliği, iç geçerlik ile güvenirlik çalışmaları gerçekleştirilmiştir. Yapı geçerliğini test etmek için Doğrulayıcı Faktör Analizi (DFA) uygulanmıştır. DFA sonucunda MAIT Türkçe formunun SRMR uyum indeksinde mükemmel uyum, diğer indekslerde ise kabul edilebilir uyum değerine sahip olduğu belirlenmiştir. Formun iç geçerliğini sınamak için envanterin tamamı ile her bir alt-faktör arasındaki korelasyon incelenmiştir. Güvenirlik çalışmaları kapsamında yapılan analizler sonucunda ise McDonald's ω güvenirlik katsayısı .94 olarak tespit edilmiştir. Araştırma sonucunda, MAIT Türkçe Formu'nun öğretmenlerin kendi öğretimsel süreçlerine ilişkin bilişsel farkındalıklarını ölçme amacıyla kullanılabilecek geçerli ve güvenilir bir ölçme aracı olduğu belirlenmiştir.
Anahtar Kelimeler: Bilişsel farkındalık envanteri, envanter uyarlama, geçerlik ve güvenilirlik, öğretmenler

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[a] This study was derived from a master's thesis titled "Adaptation of the MAIT Inventory to Turkish and Examination of Instructional Metacognitive Awareness Levels of Primary School Teachers" prepared within the Department of Primary Education, IES, Gaziantep University.

[b] Bu çalışma, Gaziantep Üniversitesi Eğitim Bilimleri Enstitüsü Sınıf Eğitimi Anabilim Dalı bünyesinde hazırlanan "MAIT envanterinin Türkçe'ye uyarlanması ve sınıf öğretmenlerinin öğretimsel bilişsel farkındalık düzeylerinin incelenmesi" başlıklı yüksek lisans tezinden elde edilmiştir.

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Genişletilmiş Türkçe Özet

Giriş

Türkçe alanyazında, biliş üstü, üstbiliş, metabiliş, biliş ötesi olarak da ifade edilen bilişsel farkındalık, bireylerin kendi düşünme süreçlerinin farkında olması ve bu süreçleri hedefleri doğrultusunda kontrol edebilmesidir (Flavell, 1979). Öğrencilerin bilişsel farkındalıklarını geliştirmede, öz yeterlik algılarını arttırmada (Alcı vd., 2010; Oguz & Kalender, 2018) ve akademik başarılarını yükseltmede katkı sağlamaktadır (Bergstresser, 2013; Bianchi, 2007; Canca, 2005; Demir, 2009; Kummin & Rahman, 2010; Ozturk & Kurtulus, 2017; Pehlivan, 2012; Sawhney & Bansal, 2015; Young & Fry, 2008). Bilişsel farkındalık becerileri, öğrencilerin problem çözme (Bars, 2016; Karakelle, 2012; Ozsoy, 2007), ile dinlediğini ve okuduğunu anlama (Gelen, 2003; Karbalaei, 2011; Katrancı, 2012; Kuruyer & Ozsoy, 2016) gibi bilişsel becerilerini geliştirmenin yanı sıra; motivasyonlarını arttırmakta (Asık, 2009; Yangın, 2014), sınav kaygılarını ise azaltmaktadır (Ekenel, 2005). Tüm bu araştırma sonuçları, bilişsel farkındalık becerilerinin, öğrencilerin eğitim-öğretim süreçlerinde yaşayabilecekleri zorlukları aşmalarına ve başarıya ulaşmalarına katkı sağladığının göstergesi olarak değerlendirilebilir.

Bilişsel farkındalık becerisinin geliştirilmesinde öğretmenler kritik role sahiptir (Cotton, 2010; Demir, 2009; Gelen, 2003; Senemoglu, 2020). Öğretmenlerin bu beceriye sahip olmaları öğretme-öğrenme sürecinin niteliğini arttırmaktadır. Bilişsel farkındalık düzeyleri yüksek olan öğretmenler, öğrencilerine etkin rehberler olmakta (Demir & Doganay, 2008), öğrencilerini farklı açılardan değerlendirebilmekte (Gelen, 2003), öğretim materyallerini daha etkin kullanmakta ve öğretim sürecinde gereksiz ayrıntılara girmekten kaçınmaktadırlar (Paris & Winograd, 2003). Ayrıca, bu becerisi yüksek olan öğretmenler öğretim sürecini etkili bir şekilde planlamakta (Tsui, 2003), izleme faaliyetini başarıyla gerçekleştirmekte (Doganay & Ozturk, 2011) ve ders sürecini çok boyutlu bir şekilde değerlendirebilmektedirler (Ozturk & Ozyurt, 2020). Tüm bu çalışmalar göz önünde bulundurulduğunda, öğretmenlerin bilişsel farkındalık becerilerinin ölçülmesinin ve ihtiyaç duyulması halinde geliştirilmesinin önemli olduğu ifade edilebilir.

Alanyazın incelendiğinde bilişsel farkındalığın ölçümlenmesine ilişkin bir çok envanter geliştirildiği (Balcıkanlı, 2011; Chen vd., 2009; Miholic, 1994; Myers & Paris, 1978; O'Neil & Abedi, 1996; Paris & Jacobs, 1984; Schraw & Dennison, 1994; Sperling vd., 2002) veya Türkçeye uyarlandığı görülmektedir (Akın vd., 2007; Cetinkaya & Erktin, 2002; Durdukoca & Arıbas, 2019; Karatay, 2009; Kınay, 2013; Ozyeşil vd., 2011). Ancak, alanyazında öğretmenlerin kendi öğretimlerine ilişkin bilişsel farkındalıklarını, alanyazında kabul görmüş modeller çerçevesinde ölçen Türkçe bir ölçme aracına ulaşılamamıştır. İngilizce olarak erişilen ölçme aracı ise araştırmaya konu olan "Metacognitive Awareness Inventory for Teachers (MAIT)"tır (Balcıkanlı, 2011). Bu envanterin Türk kültüründe geliştirilmiş olması ve bilişsel farkındalığa ilişkin alanda en çok kabul gören modellerden biri olan Schraw ve Moshman'ın (1995) bilişsel farkındalık modeli temele alınarak yapının oluşturulması nedeniyle envanter önemli bir ölçme aracı olarak değerlendirilmiştir. Ancak, hem MAIT envanterinin kullanımının İngilizce bilen öğretmen adayları ile sınırlı kalmayıp tüm branşlardaki öğretmenlere de uygulanabilecek bir özellikte olmaması hem de öğretmenlerin kendi öğretimlerine ilişkin bilişsel farkındalıklarını ölçümlemeye yönelik Türkçe alanyazındaki ölçme aracı eksikliğinin var oluşu nedeniyle bu envanterin Türkçeye uyarlanması önemli görülmüştür. Bu bağlamda, araştırmanın amacı; öğretmenlerin kendi öğretimsel süreçlerine ilişkin bilişsel farkındalıklarını ölçme amacıyla geliştirilmiş olan MAIT'i Türkçeye uyarlamak ve psikometrik özelliklerini test etmek olarak belirlenmiştir.

Yöntem

Bu araştırma, bir ölçek uyarlama çalışmasıdır. Araştırmanın çalışma grubunu, 2021-2022 eğitim öğretim yılında Türkiye'nin Gaziantep ve Şanlıurfa illerindeki ilköğretim ve ortaöğretim kademelerinde

görev yapan, farklı branş ve kıdeme sahip 407 öğretmen oluşturmaktadır. Çalışma grubunu belirlemek için olasılıklı olmayan örneklem tekniklerinden kota örnekleme tercih edilmiştir (Gurbuz & Sahin, 2016). Envanter, 24 madde ve altı faktörden oluşmaktadır. Envanterin Türkçeye uyarlama sürecinde dil geçerliği, kavramsal ve deneyimsel eşdeğerlik, yapı geçerliği, iç geçerlik ile güvenirlik çalışmaları gerçekleştirilmiştir (Hambleton & Patsula, 1999).

Bulgular

Yapı geçerliğini test etmek için uygulanan Doğrulayıcı Faktör Analizi (DFA) sonucunda MAIT Türkçe Formu'nun SRMR uyum indeksinin mükemmel uyum; X^2/df, CFI, TLI ve RMSEA uyum indekslerinin ise kabul edilebilir uyum aralığında olduğu belirlenmiştir. Maddelerin standardize edilmiş faktör yüklerinin ise .43 ile .76 aralığında değiştiği tespit edilmiştir. Ayrıca tüm maddelerin faktör yükleri .01 anlamlılık düzeyindedir.

Envanterin iç geçerlik çalışmaları kapsamında yapılan analizlerin sonucunda envanter toplam puanı ve her bir faktörden alınan toplam puanlar arasındaki ilişki Pearson korelasyon katsayısı hesaplanarak belirlenmiştir. Bu ilişkinin olumlu yönde, yüksek düzeyde ve anlamlı bir ilişki olduğu saptanmıştır. Faktörler arasında ise daha düşük düzeyde bir korelasyon bulunmaktadır. Bu bulgular, her faktörün kendi içinde ve envanterin tamamı ile uyum içinde olduğunu gösterir niteliktedir.

MAIT Türkçe formunun güvenirlik çalışmaları kapsamında, envanterin tamamının ve her bir faktörünün McDonald's ω katsayıları, testi yarılama güvenirliği, madde toplam korelasyonları ve madde ayırt edicilik değerleri analiz edilmiştir. 24 maddeden oluşan envanterin Türkçe formunun tamamında McDonald's ω katsayısı .94 olarak hesaplanmıştır. Altı faktörlü yapının alt faktörlerine ilişkin McDonald's ω katsayıları ise sırası ile F1 (.68), F2 (.71), F3 (.63), F4 (.76), F5 (.77) ve F6 (.72) olarak hesaplanmıştır. Ayrıca alınan toplam puanlara göre belirlenen %27'lik alt grup ile %27'lik üst grup puanlarına bağımsız gruplar t-testi uygulanmıştır. Analiz sonucunda, gruplar arasında her bir madde için farkın anlamlı olduğu ve t değerlerinin -22.44 ile -9.19 aralığında değiştiği belirlenmiştir. Bu bulgular, ölçeğin Türkçe formunun güvenilir bir ölçme aracı olduğuna işarettir.

Tartışma ve Sonuç

Bu araştırma kapsamında, MAIT'in Türkçeye uyarlama çalışmaları gerçekleştirilmiştir. Araştırma sonucunda, MAIT Türkçe Formu'nun dil geçerliğini sağladığı tespit edilmiştir. Ardından, envanterin Türkçe formunun yapı (DFA) ve iç geçerliği test edilmiştir. DFA sonucunda standardize edilmiş faktör yüklerinin .43 ile .76 aralığında değer aldığı ve bu değerlerin anlamlı olduğu belirlenmiştir (Tabachnick vd., 2013). Bununla birlikte envanterin Türkçe formunun SRMR uyum indeksinde mükemmel uyum; diğer indekslerde kabul edilebilir uyum değerine sahip olduğu belirlenmiştir. DFA'ya ilişkin bu bulgular, envanterin Türkçe formunun geçerli bir yapı sağladığını göstermektedir (Byrne, 2010; Hu & Bentler, 1999).

Envanterin Türkçe formunun iç geçerliğini sınamak amacıyla MAIT'in alt faktörlerinin envanterin tamamı ile korelasyonu incelenmiştir. Yapılan analiz sonucunda, envanterden alınan toplam puanlar ile her bir faktörden alınan toplam puan arasında olumlu yönde, yüksek düzeyde ve anlamlı bir ilişki olduğu tespit edilmiştir. Her bir faktör arasında ise orta düzeyde anlamlı bir ilişki vardır. Bu sonuçlar, her bir faktörün envanterin bileşenlerini doğru şekilde temsil ettiğini göstermektedir. Ölçeğin güvenirlik çalışmaları kapsamında ise ölçeğin tamamının ve altı alt faktörünün iç tutarlık katsayıları, testi yarılama güvenirliği, madde toplam korelasyonları ve madde ayırt edicilik değerleri hesaplanmış, elde edilen değerlerin tamamı ölçeğin güvenilir bir ölçme aracı olduğuna ilişkin kanıt sunmuştur.

Introduction

In recent years, developments in information and communication technologies have led to an incredible proliferation of information and easy access to it. This situation has highlighted the importance of not merely memorizing information, but rather constructing it and learning how to access it. Thus, learning has become student-specific and the importance of developing individualized learning strategies has increased. The responsibilities of students in managing their own learning processes have also grown (Deniz et al., 2014). In addition to what students learn (Ekici & Uslu, 2020), how they learn – referred to as "learning to learn" – has also become a central focus in education. Such developments have led the concept of metacognition to rise to a critical position in the field of education (Perry et al., 2019; Salam et al., 2020).

So, what is metacognition? According to Flavell (1979), metacognition is being aware of one's thinking processes and being able to control them in line with one's own goals. Similarly, Paris et al. (1983) define metacognition as individuals being aware of their thinking processes. Costa (1984) explains this concept as the ability to be aware of what we know and what we do not know, to know the mental methods we use while solving problems, to evaluate our cognitive outputs, and to reflect on them. In the light of other definitions and information in the literature, metacognition can be described as an individual's awareness of their cognitive processes and regulation of these processes (Annevirta & Vauras, 2006; Baykara, 2011; Kiremitci, 2011; Schraw & Dennison, 1994).

There are many models in the literature to explain metacognitive awareness (Brown, 1987; Flavell, 1979; Marzano et al., 1988; Paris & Winograd, 1990; Schraw & Dennison, 1994; Schraw & Moshman, 1995). To thoroughly understand the concept of metacognition, it is beneficial to examine some of the models related to this concept. For example; according to Flavell's (1979) model, metacognitive awareness occurs through actions and interactions among four components. These components are; (1) metacognitive knowledge, (2) metacognitive experience, (3) tasks and goals, and (4) strategies and actions. Metacognitive awareness is explained in two dimensions in the model of Marzano et al. (1988). The first dimension is the knowledge and control of oneself, the second dimension is the knowledge and control of the process. The first dimension encompasses commitment, attitude, and attention. Commitment is the individual's choice for being decisive in their work; attitude is the negative or positive thoughts an individual has about any topic; attention is the individual's capability to activate their perceptions towards awareness of internal or external stimuli. Knowledge and control of the process consist of evaluation, planning, and regulation dimensions. Evaluation is to make a judgment about the current status of all stages in the problem-solving process. Planning is the process of consciously selecting convenient strategies to reach set goals. Regulation is the process of reviewing the way taken towards the goals, if necessary, replacing the current behavior with a more effective behavior model. The measurement tool used in the study was developed based on Schraw and Moshman's (1995) metacognitive awareness model, which divides metacognitive awareness into two main components: knowledge of cognition and regulation of cognition. The former is generally described as the knowledge of individuals about their own cognitive processes. Schraw and Moshman (1995) claims that there are three different types of knowledge in the knowledge dimension of cognition: declarative, procedural, and conditional knowledge. Declarative knowledge is an individual's thoughts about their own competence. Procedural knowledge is knowing what to do in order to achieve the desired outcomes when doing a job or solving a problem. Conditional knowledge is a person's knowledge of what to do and when to do it while solving a problem. The latter contains subdimensions of planning, monitoring, and evaluation. Planning is to determine the methods, techniques, and tools that an individual will use to reach one's goals. Monitoring is the process in which an individual focuses on solving problems or fulfilling the responsibilities of a task, determines the practices that contribute to success and those that do not, and makes the necessary changes. Evaluation refers to the control of how well an individual reaches the goals they set and how effective their performance is in this process. While there is no universally accepted model, most researchers agree on the basic elements of metacognition. Researchers state that metacognition can be examined

in two core dimensions which are knowledge of cognition and organization of cognition. Knowledge of cognition is defined as a person's knowledge of one's mental processes. Regulation of cognition refers to a person's ability to control one's mental processes until the goal is achieved (Schraw & Moshman, 1995). In this respect, metacognition has a great contribution to the learning-teaching processes.

Studies in the literature determine that developing students' metacognitive skills improves students' self-efficacy perception (Alcı et al., 2010; Oguz & Kalender, 2018). It is also revealed that the development of students' metacognitive skills increases their academic achievement (Bergstresser, 2013; Bianchi, 2007; Canca, 2005; Demir, 2009; Kummin & Rahman, 2010; Ozturk & Kurtulus, 2017; Pehlivan, 2012; Sawhney & Bansal, 2015; Young & Fry, 2008). In addition, metacognition has been found to improve students' skills such as problem-solving (Bars, 2016; Karakelle, 2012; Ozsoy, 2007), listening and reading comprehension (Gelen, 2003; Karbalaei, 2011; Katrancı, 2012; Kuruyer & Ozsoy, 2016). Developing metacognition also enhances students' motivation (Asık, 2009; Yangın, 2014) and reduces test anxiety (Ekenel, 2005). As indicated by the research findings, enhancing students' metacognitive awareness skills contributes to their individual development, learning processes and academic success in several ways.

So, how can these skills be developed among students? Research shows that teachers who are aware of what metacognitive skills are and who make an effort to develop these skills improve their students' metacognition by using these skills more successfully (Esendemir, 2011; Ogras, 2011). Other studies in the literature emphasize a similar situation and draw attention to the critical role of the teacher in teaching metacognitive skills (Demir, 2009; Gelen, 2003; Senemoglu, 2020). These and similar studies also point out the importance of determining teachers' metacognition levels as teachers' competencies in these skills can also be decisive in the development of students' metacognitive skills. Moreover, teachers' possession of this skill increases the quality of the learning-teaching process. For example, it has been found that teachers with high levels of metacognition are more effective in guiding their students (Demir & Doganay, 2008). They can evaluate their students from different perspectives (Gelen, 2003), use the materials they have more effectively and avoid unnecessary details in the teaching process (Paris & Winograd, 2003).

In addition to these results, studies that investigate the correlation between teachers' competence in the teaching process and metacognitive awareness were also examined. In these studies, teachers with high metacognition levels were found to plan the teaching process effectively (Tsui, 2003), carry out monitoring activities successfully (Doganay & Ozturk, 2011), and evaluate the lesson process in a multidimensional way (Ozturk & Ozyurt, 2020). On the other hand, teachers with low competence encountered difficulties in the planning phase (Tok, 2010), conducted a limited number of monitoring activities (Ozturk & Ozyurt, 2020), and performed less comprehensive evaluations in the teaching process (Fernandez & Ritchie, 1992). These findings underscore that having metacognitive skills increases teachers' competence in the teaching process. The fact that these skills contribute to educational activities in various ways makes it important to determine teachers' metacognition levels. However, while determining these levels it is thought that teachers' teaching processes should also be focused on.

When the literature is examined, it is seen that numerous measurement tools have been developed for the measurement of metacognition. However, these studies are generally aimed at measuring students' metacognition. The first inventory developed in this context belongs to Myers and Paris (1978). This inventory, which was developed to determine elementary school students' awareness of the reading process, includes open-ended questions. Paris and Jacobs (1984) reorganized this inventory according to planning, organizing, and evaluating, which are the subdimensions of metacognitive awareness, and transformed it into a format consisting of 15 open-ended questions. Miholic (1994) developed a new measurement tool for high school and university-level students based on Paris and Jacobs' (1984) inventory. This 10-question instrument was designed to identify students' problems in using metacognitive strategies during reading and to make them aware of these strategies.

Moreover, the assessment of metacognitive capabilities extends to various educational grades and age groups. O'Neil and Abedi (1996) devised the Metacognitive Status Inventory, aiming at 12th-grade students to gauge metacognition along dimensions such as planning, cognitive strategy, awareness, and self-control. Sperling et al. (2002) contributed to this field by establishing a scale tailored for children, specifically designed for evaluating metacognition in students ranging from the third and ninth grades. Chen et al. (2009) introduced the "Metacognitive Reading Awareness Inventory" as a self-assessment tool targeted at appraising university students' awareness of reading academic content. Furthermore, tools created for adults contain the comprehensive inventory designed by Schraw and Dennison (1994), consisting of 52 items and encompassing two principal dimensions: knowledge of cognition and regulation of cognition. This inventory has found prevalent use in related literature, as noted by Balcıkanlı (2011). In addition, Brown and Ryan (2003) formulated the "Mindfulness Scale (MBS)" comprising 15 items and designed to measure the general inclination toward awareness of momentary experiences in daily life.

Studies on inventories for measuring metacognition in Türkiye show that both scale adaptation and scale development have been conducted in this area. In this context, many scales mentioned above have been adapted into Turkish. Akın et al. (2007) adapted Schraw and Dennison's (1994) Metacognitive Awareness Inventory, and Karakelle and Sarac (2007) adapted Sperling et al.'s (2002) Metacognitive Awareness Scale for Children into Turkish. Ozyesil et al. (2011) adapted the Mindfulness Scale developed by Brown and Ryan (2003) into Turkish.

Additionally, measurement tools have also been developed in Türkiye to measure metacognition. For example, the metacognitive awareness inventory developed by Cetinkaya and Erktin (2002) measures sixth-grade students' metacognitive awareness in the subdimensions of evaluation, self-control, awareness, and cognitive strategies. Karatay (2009) developed a measurement tool to assess the metacognitive awareness levels of students in academic reading processes. This scale, which can be applied to middle school, high school, and university students, consists of three dimensions: planning, monitoring, and evaluation. Durdukoca and Arıbas (2019) designed an inventory called the "Metacognitive Awareness Scale" to examine the metacognitive awareness levels of prospective teachers. Kutluca et al. (2022) also developed the Meta-Cognitive Awareness Scale (MAS-EVA) to be conducted during classroom instruction and for assessing students. The purpose of this instrument is to evaluate teachers' awareness of how they monitor and assess their teaching practices, their cognitive effectiveness, and the methods they apply for summative assessment of learner outcomes. The constituent subdimensions of the measurement instrument were described as encompassing the observation and evaluation of instructional practices within the classroom environment and their cognitive impact. In addition, it involved the appraisal of methodologies employed in the summative assessment of learner outputs and the examination of metacognitive colleague interactions and the reciprocal exchange of opinions. Another study on this subject was conducted by Guzel and Basokcu (2023). In this study, firstly, "a multilevel model of metacognitive regulation in education" that includes metacognitive goals, monitoring, and control processes regarding teachers' own, students', and teachers' students' cognition was proposed. Secondly, within the framework of the proposed model, "teacher-self" and "teacher-classroom" forms of the "metacognitive regulation in education inventory (PMIER)" were created for the dimensions in which teachers metacognitively regulate their metacognition and the metacognition of their class. The subdimensions of both forms were defined as goal, control, and monitoring.

Despite the existence of these tools to measure the metacognitive awareness levels of students studying at various levels of education for different purposes, there is still no Turkish measurement tool in the literature to assess teachers' instructional metacognitive awareness across all key dimensions. The measurement tool serving this purpose is the "Metacognitive Awareness Inventory for Teachers (MAIT)" which is available in English (Balcıkanlı, 2011). This inventory was developed by applying it to senior English language teaching students studying at a university in Türkiye. Its items are applicable to teachers. In the development of the MAIT, the metacognitive

awareness model of Schraw and Moshman (1995) served as a foundational framework. This model is made up of two dimensions: knowledge of cognition and regulation of cognition. The dimension of knowledge of cognition includes the subdimensions of declarative knowledge, procedural knowledge and conditional knowledge; the dimension of regulation of cognition comprises the subdimensions of planning, monitoring and evaluation. Similarly, the MAIT inventory measures teachers' metacognitive awareness of their own teaching in these six dimensions. While the model pays attention to the individual's own learning process, the MAIT inventory pays attention to the evaluation of the teaching process in the context of the same dimensions. In other words, while the model focuses on the learner's metacognitive awareness of one's learning processes, the MAIT inventory is concerned with the teacher's metacognitive awareness of one's own teaching. The fact that the inventory was developed in Turkish culture and that the structure was designed based on the metacognitive awareness model of Schraw and Moshman (1995), one of the most accepted models in the field of metacognitive awareness, indicates that the inventory can be deemed as a crucial measurement tool. For this reason, it is considered important to adapt the inventory to Turkish to be able to eliminate the lack of measurement tools in the Turkish literature to measure teachers' metacognitive awareness related to their own teaching and to ensure that the use of the MAIT inventory is not limited to English-speaking prospective teachers but can be applied to all teachers in different branches. Within this framework, this study sought to adapt the MAIT, which was developed to measure teachers' metacognitive awareness of their instructional processes, into Turkish and to test its psychometric characteristics. With the measurement tool to be developed in this study, the levels of teachers related to their metacognitive awareness of teaching processes can be detected and if any deficiency in teachers' skills is realized, this deficiency can be addressed through targeted professional development. In conclusion, this research is significant not only because it fills the gap in relevant literature, but also because of its potential to contribute to teachers' professional development and their learning-teaching practices provided at the K12 level.

Method

Research Model

This research contains a scale adaptation process. Initially, studies were conducted to ensure the linguistic equivalence of the Turkish version of the inventory. Following this, the inventory adapted to Turkish was tested in terms of language, construct, and internal validity. A reliability analysis of the inventory was also conducted. In this context, McDonald's ω values, item-total correlations, and item discrimination values of the whole inventory and each subdimension were analyzed (Hambleton & Patsula, 1999).

Study Group

The original form of MAIT was developed with the study group of pre-service ELT teachers. However, the inventory aims to measure teachers' metacognitive awareness of teaching. For this reason, it was deemed more appropriate to work with in-service teachers rather than pre-service teachers in the adaptation process. Within the scope of the study, data were collected from a total of 498 teachers working in Gaziantep and Şanlıurfa provincial centers in Türkiye in the 2021-2022 academic year. Quota sampling which is one of the non-probability sampling techniques was employed to determine the study group. In this sampling technique, the researcher first divides the research universe into categories in terms of certain features. Later on, the proportions of these groups in the research universe (quota) are determined and the participants are involved in the research within this quota (Gurbuz & Sahin, 2016). This technique was chosen to ensure that the inventory adjusted within the scope of the research is applicable to teachers with different backgrounds. In selection of these teachers, care was taken to ensure diversity in variables such as gender, seniority, school type, branch, and education level. Outliers were removed from the data and the data collected from 407 teachers

were included in the analysis. Demographic information of the 407 teachers constituting the study group is presented in Table 1.

Table 1

Distribution Of Participants According to Demographic Characteristics

Variables		f	%
Gender	Female	271	66.8
	Male	135	33.2
Seniority	1-4 year	140	34.4
	5-9 year	110	27.0
	10-14 year	46	11.3
	15-19 year	34	8.4
	20-24 year	42	10.3
	25 year and more	35	8.6
School type	Kindergarten	22	5.4
	Primary School	229	56.3
	Middle School	52	12.8
	High School	104	25.6
Branch	Kindergarten Teachers	26	6.4
	Primary School Teachers	202	49.6
	In-Field-Teachers	179	44.0
Education level	Associate Degree	7	1.7
	Bachelor Degree	326	80.1
	Post Graduate	74	18.2
Total		407	100.0

In factor analysis studies, the sample size is expected to be 10 times the number of items on the scale (Bryman & Cramer, 2001; Floyd & Wideman, 1995; Kline, 2011). The number of items on the adapted scale is 24 and the number of participants is 407. In the study, approximately 17 times the number of participants is reached. Accordingly, the study group meets the necesarry sample size criteria.

Metacognitive Awareness Inventory for Teachers (MAIT)

The MAIT was designed by Balcıkanlı (2011) to assess the teachers' metacognitive awareness level of their instructional processes. The MAIT inventory was created based on the metacognitive awareness model of Schraw and Moshman (1995). This model comprises two dimensions: knowledge of cognition and regulation of cognition. While the dimension of knowledge of cognition contains the subdimensions of declarative knowledge, procedural knowledge and conditional knowledge; the dimension of regulation of cognition contains the subdimensions of planning, monitoring and evaluation. Likewise, the MAIT inventory measures the teachers' metacognitive awareness of their own teaching processes in these six dimensions. MAIT consists of 24 items and is designed in a five-point Likert type, each item of this inventory is graded as "Strongly Disagree", "Disagree", "No Opinion", "Agree" and "Strongly Agree". The inventory development study was carried out in three stages. In the first stage, the first version of the inventory consisting of 42 items was created by conducting a literature review and obtaining expert opinions. This version was administered to 323 ELT prospective teachers studying at a university in Türkiye and tested by factor analysis. In the second stage, six items were eliminated. After the inventory was presented to the expert opinion, the second version of the inventory with 36 items was re-administered for the second version of the inventory. The third version with 24 items obtained as a result of the analysis was tested by collecting data again, and the results confirmed the construct. Factor I (declarative knowledge) includes the items; 1, 7, 13, 19, Factor II (procedural knowledge); 2, 8, 14, 20, Factor III (conditional knowledge); 3, 9, 15, 21, Factor IV (planning); 4, 10, 16, 22, Factor V (monitoring); 5, 11, 17, 23 and Factor VI (evaluation) includes the

items; 6, 12, 18 and 24. While developing the original form, reliability was tested with Cronbach's Alpha reliability test. As a result of the analysis, Cronbach's Alpha reliability coefficients were calculated as 0.85 for Factor I, 0.82 for Factor II, 0.84 for Factor III, 0.81 for Factor IV, 0.80 for Factor V, and 0.79 for Factor VI (Balcıkanlı, 2011). The MAIT inventory was adapted into Turkish and used in this study as "Öğretmenler İçin Bilişsel Farkındalık Envanteri" (ÖBFE).

Adaptation Process of the Inventory into Turkish

During the adaptation process, firstly, Dr. Balcıkanlı was contacted via e-mail, and permission was received to adapt the scale for use in Turkish. Afterward, the scale was presented to the opinions of two academicians working on instructional metacognitive awareness for its adequacy to serve the purpose by considering such criteria; scale type and format, research context, target audience, practicability, and cultural/linguistic suitability. Positive feedbacks were received regarding the scale and after this stage, the linguistic equivalence studies of the inventory were initiated.

Procedures regarding linguistic equivalence: At this stage, the first step was the translation, and the translation process was accomplished with the help of four English teachers working in public schools. In the beginning, the translation was conducted by researchers. During the translation, the cultural, psychological, and grammatical differences of both languages were considered carefully (Turkish and English) (International Test Commission [ITC], 2018). After the translation was completed, the researchers consulted the English teachers to check the Turkish translation and made the necessary adjustments in the Turkish form of the inventory. For example, in the first stage, item 13 of the inventory was translated as "Ne kadar iyi öğrettiğim konusunda kontrol sahibiyim" [I have control over how well I teach]. This item was later revised to "Ne kadar iyi öğrettiğimi kontrol ederim". Throughout the process, the following criteria were considered; clarity, accuracy, fluency, terminology, and relevant context. After the necessary changes were made, the Turkish form was submitted to the opinion of Dr. Balcıkanlı, who developed the MAIT. The changes were also made in line with the opinion of him. For example, the ninth item of the Turkish version of the inventory was corrected from "Öğretmem gerektiğinde kendimi motive edebilirim." to "Ders anlatmam gerektiğinde kendimi motive edebilirim." Afterwards, the inventory was examined by two Turkish language experts in terms of spelling, grammar and meaning. At this stage, the 11th item of the inventory was revised. The item "Öğretim yaparken kendimi kullandığım öğretim tekniğinin ne kadar işe yaradığını değerlendirirken bulurum" was replaced with "Ders işlerken kullandığım öğretim tekniğinin ne kadar işe yaradığını değerlendiririm." After these processes were completed, the linguistic equivalence of the inventory was tested. In this context, the English and Turkish forms of the inventory were administered in four-week intervals to 16 English teachers working in public schools, as they were adequately proficient in both languages. The correlation coefficient of the total scores obtained by first applying the English form and then the Turkish form was found to be 0.86. After it was determined that the linguistic equivalence between the forms was ensured, the Turkish form of the inventory was piloted with 21 primary school teachers. The teachers who participated in the pilot application stated that the items in the inventory were clear and understandable. The inventory was then made ready to be applied for construct and internal validity analyses.

Data Analysis

Before the analysis, univariate and multivariate outlier analysis was performed to identify outliers in the data set. First of all, the z test was applied for univariate outlier analysis, and the z score was taken between -3.00 and +3.00 as the reference value (Tabachnick et al., 2013). The 91 data falling outside the standardized z-score range were excluded from the data set. Afterwards, Mahalonobis distance coefficient was calculated for multivariate outlier analysis and no data below the threshold value of 0.001 was found. After these procedures, the distribution of the remaining 407 data was tested. In the study, the skewness and kurtosis test was applied to the data for compatibility with multivariate normal distribution. Based on the analysis results, the skewness value was obtained as

.405 and the kurtosis value as -.704. Since these values are within the range of ±1, the data set conforms to normal distribution criteria (George & Mallery, 2010).

Procedures regarding construct validity: The original form of the inventory consists of 24 items and six-factor structure. CFA was applied to test whether this structure was confirmed in the Turkish form of the inventory, that is, to test the construct validity of the inventory. To determine whether the model tested with CFA is adequate or not, the fit indices acquired from the analysis were evaluated based on the fit criteria. In this study, standardized value according to the size of the sample (X^2/df), CFI (comparative fit index), TLI (Tucker-Lewis index), SRMR (Standardized Root Mean Square Residual), BIC (Bayesian Information Criteria), AIC (Akaike Information Criteria), and RMSEA (square root of the mean of prediction errors) values were used as fit indices (Capık, 2014; Cokluk et al., 2014; Hu & Bentler, 1999; Ilhan & Cetin, 2014). Jamovi statistical program was used in the analysis.

Procedures regarding internal validity: Analyses regarding the internal validity of the inventory were conducted using the IBM SPSS 25 program. At this stage, by calculating the Pearson correlation coefficient, the correlation between the whole scale and each factor was analyzed.

Procedures regarding reliability studies: In the context of the Inventory's reliability studies, McDonald's ω (internal consistency) coefficients for each factor were examined. In addition, item-total correlations and item discriminations of the inventory were tested. IBM SPSS 25.0 program was conducted in the reliability analysis of the inventory.

Research Ethics

This research was ethically reviewed and approved by the Gaziantep University Social and Human Sciences Ethics Committee. The ethics approval was granted on May 6, 2022, with the issue number 171710. Maximum care was taken to align with ethical principles for this research. The measurement tool used in the study was applied with permission from its creator. Before the data collection process, potential participants were asked whether they were going to participate voluntarily or not, and necessary data were collected only from those who were willing. Participants were informed in a detailed way about the aim, process, and confidentiality principles of the study.

Throughout the entire research process, all stages were employed by following the *Directive on Scientific Research and Publication Ethics of Higher Education Institutions*. The study complied with the *Ethical Principles of Higher Education Institutions*, the *COPE (Committee on Publication Ethics) International Standards for Editors and Authors*, and all related ethical standards.

Findings

The findings of CFA, internal validity and reliability analyses for the Turkish version of the MAIT inventory are presented below.

MAIT Turkish Form CFA Results

Consisting of 6 factors and 24 items, the Turkish form of the inventory was tested with CFA to verify the original structure. Table 2 presents the CFA results for the Turkish form and the excellent and acceptable fit value ranges for the fit indices used in the interpretation of the data.

Table 2 shows that the SRMR fit index is in the excellent fit range, while the X^2/df, CFI, TLI and RMSEA fit indices are in the acceptable fit range with a 90% confidence interval and significant at the 0.01 level of significance. The calculated value of CMIN/df is 3.23. Since it is below 5, this finding is considered acceptable by Sumer (2000). Furthermore, Bagozzi and Yi (1988) emphasize that the smaller the CMIN/df value, the better the fit. The CFI value obtained in the study was .89. This index measures how closely the model of the study fits the base model and is in the acceptable fit range (Kline, 2011). Similarly, the TLI value was calculated as .87.

Table 2

MAIT Turkish Form CFA Results

Fit Indexes	Excellent Fit Criteria	Acceptable Fit Criteria	Calculated Indices	Results
X^2/df	$0 \leq X^2/df \leq 2$	$2 \leq X^2/df \leq 5$	3.23	Acceptable fit
CFI	.95 ≤ CFI ≤ 1.00	.80 ≤ CFI ≤ .95	0.89	Acceptable fit
TLI	.95 ≤ TLI ≤ 1.00	.80 ≤ TLI ≤ .95	0.87	Acceptable fit
SRMR	.00 ≤ SRMR ≤ .05	.05 ≤ SRMR ≤ .10	0.05	Excellent fit
RMSEA	.00 ≤RMSEA≤ .05	.05 ≤RMSEA≤ .08	0.07	Acceptable fit
AIC	The Model with the Smallest Value Among the Compared Models			
BIC	The Model with the Smallest Value Among the Compared Models			

Source: (Capık, 2014; Cokluk et al., 2014; Hu & Bentler, 1999; Ilhan & Cetin, 2014)

According to Tabachnick et al. (2013), a value between .80 and .95 for TLI represents an acceptable fit, which means that the TLI in the study indicates an acceptable model. The RMSEA calculated as .07 in the study is one of the absolute fit indices and in the acceptable fit range. This index measures how good the fit is, with values closer to zero indicating a better fit, and it is in the acceptable fit range according to Tabachnick et al. (2013). SRMR value was calculated as .05. According to Hu and Bentler (1999), the SRMR value is expected to be between 0 and .05 for a perfect fit. In this context, the SRMR value calculated in the study was determined as .05, indicating an excellent fit. These results indicate that the fit level of the six-factor structure of the MAIT Turkish form is adequate. The path diagram of the six-factor model derived by CFA is presented in Figure 1.

Figure 1

The path diagram of the Metacognitive Awareness Inventory for Teachers (Turkish form)

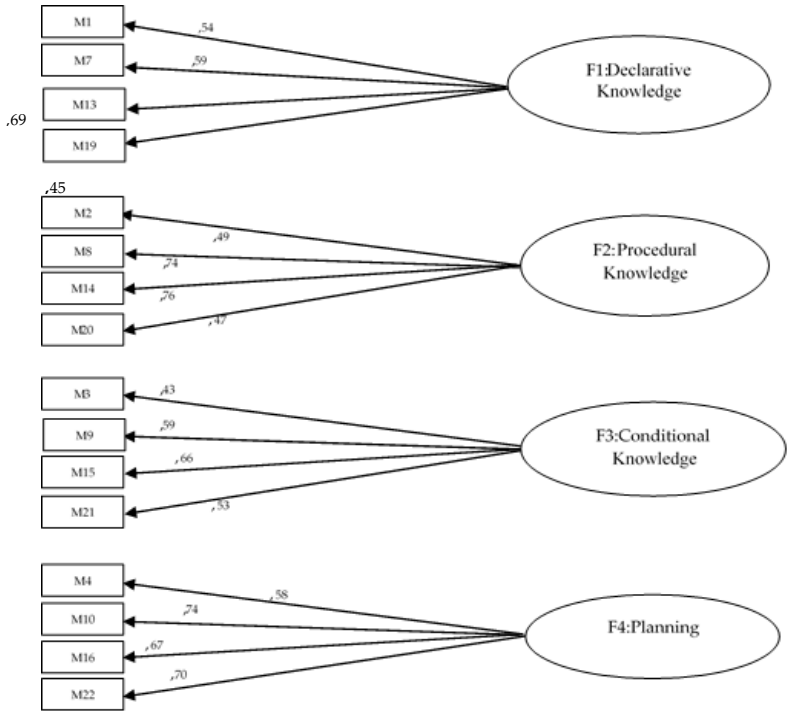
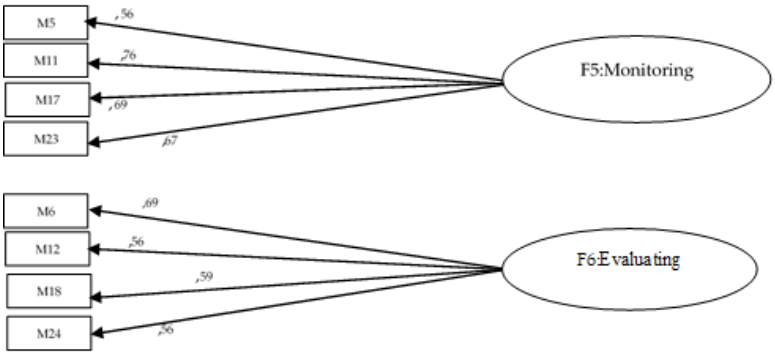


Figure 1 (Cont.)

The path diagram of the Metacognitive Awareness Inventory for Teachers (Turkish form)



The factors loadings of the items, derived from the CFA, are shown in Table 3.

Table 3

MAIT Turkish Form Factor Loadings

				95% Confidence Interval				
Factor	Indicator	Estimate	SE	Lower	Upper	Z	p	SE
Declarative Knowledge	Item 1	.26	0.02	0.22	0.31	11.08	< .001	.54
	Item 7	.33	0.03	0.28	0.38	12.18	< .001	.59
	Item 13	.36	0.02	0.31	0.40	15.25	< .001	.69
	Item 19	.30	0.03	0.24	0.37	9.08	< .001	.45
Procedural Knowledge	Item 2	.23	0.02	0.19	0.28	10.09	< .001	.49
	Item 8	.38	0.02	0.33	0.42	16.68	< .001	.74
	Item 14	.39	0.02	0.35	0.43	17.50	< .001	.76
	Item 20	.28	0.03	0.22	0.33	9.56	< .001	.46
Conditional Knowledge	Item 3	.28	0.03	0.22	0.34	9.40	< .001	.43
	Item 9	.32	0.03	0.27	0.36	12.56	< .001	.59
	Item 15	.34	0.02	0.30	0.39	14.63	< .001	.66
	Item 21	.32	0.03	0.27	0.38	11.46	< .001	.53
Planning	Item 4	.29	0.02	0.24	0.33	12.32	< .001	.58
	Item 10	.40	0.02	0.35	0.44	16.73	< .001	.74
	Item 16	.41	0.03	0.35	0.46	14.65	< .001	.67
	Item 22	.34	0.02	0.30	0.38	15.42	< .001	.69
Monitoring	Item 5	.28	0.02	0.24	0.33	11.97	< .001	.56
	Item 11	.42	0.02	0.37	0.47	17.35	< .001	.76
	Item 17	.36	0.02	0.31	0.40	15.57	< .001	.69
	Item 23	.35	0.02	0.31	0.40	14.98	< .001	.67
Evaluation	Item 6	.36	0.02	0.31	0.40	15.23	< .001	.69
	Item 12	.40	0.04	0.33	0.47	11.28	< .001	.55
	Item 18	.34	0.03	0.28	0.39	12.25	< .001	.59
	Item 24	.43	0.04	0.35	0.50	11.54	< .001	.56

Table 3 presents that the standardized factor loadings for the items vary between .43 and .76 and all items related to the factors are significant ($p < 0.01$). The item with the lowest value in terms of standardized factor loadings was item 3 in the conditional knowledge subdimension, which was expressed as "Öğretim sürecindeki zayıf yönlerimi telafi etmek için güçlü yönlerimi kullanırım". The item with the highest value was found to be item 14 in the procedural knowledge subdimension, which

was expressed as "Ders işlerken hangi öğretim tekniğini kullandığımın farkındayım". Buyukozturk (2002) categorized a load value of 0.60 or greater as high, and 0.30-0.59 as medium. Therefore, it can be concluded that the factor loadings for all items are significant.

MAIT Turkish Form Internal Validity Findings

The internal validity of the form was assessed by calculating the Pearson correlation coefficient. The correlation between the total score obtained from the form and the scores obtained from each factor is shown in Table 4.

Table 4

Correlations Between Subdimensions and Scale Total Score:

		F 1	F 2	F3	F 4	F5	F6
	r	.83**	.87**	.89**	.88**	.89**	.84**
Total	p	.00	.00	.00	.00	.00	.00
	N	.41	.41	.41	.41	.41	.41
	r		.72**	.70**	.64**	.69**	.61**
F1	p		.00	.00	.00	.00	.00
	N		.41	.41	.41	.41	.41
	r			.73**	.72**	.73**	.64**
F2	p			.00	.00	.00	.00
	N			.41	.41	.41	.41
	r				.77**	.76**	.67**
F3	p				.00	.00	.00
	N				.41	.41	.41
	r					.78**	.70**
F4	p					.00	.00
	N					.41	.41
	r						.71**
F5	p						.00
	N						.41

** The significance level is .01.

Table 4 shows that there is a positive, high-level, significant correlation between the total score of the scale and the total scores obtained from each factor ($p < 0.01$). This suggests that the overall scale is compatible with each of its subdimensions. However, there is a lower level of correlation between the subdimensions ($p < 0.01$). This finding can be considered as an indicator that each subdimension has a harmonious structure within itself and measures different characteristics of teachers' metacognitive awareness.

MAIT Turkish Form Reliability Findings

The reliability analysis of the Turkish MAIT included McDonald's ω (internal consistency) coefficient, item-total correlations, and item discrimination indices for the entire scale and each sub-dimension. The Turkish version of the scale, consisting of 24 items, yielded a McDonald's ω coefficient of .94. For the six-factor structure of the scale, the McDonald's ω coefficient were found as: F1 (.68), F2 (.71), F3 (.63), F4 (.76), F5 (.77), and F6 (.72). A reliability coefficient of .70 or above is considered acceptable (Buyukozturk, 2010). The t values from the independent samples t-test, conducted to examine the difference between the scores of the 27% lower group and 27% upper group, along with the item-total correlations, are shown in Table 5.

As demonstrated in Table 5, item-total correlations for each item ranged from .49 to .75, showing a positive and moderately strong relationship between each item and the overall scale score.

These results indicate that the items are coherent with the overall scale structure. To assess item discrimination, an independent samples t-test was conducted between the lower 27% and upper 27% groups based on total scale scores. The analysis showed that the differences between the upper and lower groups were statistically significant for all items, with t-values ranging from -22.44 to -9.19. According to this finding, each scale item has a discriminative feature.

Table 5

Item Total Correlation and Item Discrimination Values of MAIT Turkish Form

Factor	Item	Item Total Correlation	Mean Score		t	p
			The lower group of 27%	The upper group of 27%		
Factor 1	M1	.57	4.06	4.76	-14.91	< .001
	M7	.67	3.90	4.74	-13.05	< .001
	M13	.67	3.96	4.81	-17.24	< .001
	M19	.54	3.54	4.47	-10.42	< .001
Factor 2	M2	.54	4.04	4.64	-10.68	< .001
	M8	.75	3.93	4.85	-21.13	< .001
	M14	.74	3.94	4.86	-20.10	< .001
	M20	.53	3.85	4.54	-9.19	< .001
Factor 3	M3	.49	3.68	4.66	-9.89	< .001
	M9	.65	4.03	4.87	-16.59	< .001
	M15	.70	3.99	4.91	-22.44	< .001
	M21	.61	3.72	4.61	-12.34	< .001
Factor 4	M4	.60	4.06	4.80	-15.78	< .001
	M10	.72	3.92	4.86	-19.15	< .001
	M16	.68	3.83	4.86	-17.79	< .001
	M22	.70	3.94	4.76	-16.99	< .001
Factor 5	M5	.59	4.16	4.89	-14.60	< .001
	M11	.75	3.90	4.92	-20.30	< .001
	M17	.68	3.98	4.85	-19.17	< .001
	M23	.71	3.91	4.82	-17.75	< .001
Factor 6	M6	.70	4.04	4.93	-22.22	< .001
	M12	.60	3.64	4.65	-12.00	< .001
	M18	.61	3.93	4.78	-13.77	< .001
	M24	.62	3.42	4.59	-12.88	< .001

This discovery further remarks that the study's participant size is deemed adequate for administering factor analysis, and there is no necessity for the subtraction of any items from the model (Byrne, 2010). These outcomes confirm the reliability of the Turkish iteration of the scale as an acceptable measurement instrument.

Discussion and Results

Within the scope of this research, adaptation studies of the MAIT into Turkish were conducted. In this context, firstly, studies were carried out to ensure the linguistic equivalence of the inventory. It was determined that the inventory provided linguistic equivalence. Then, the construct (CFA) and internal validity of the Turkish form of the inventory were tested. As a result of CFA, it was determined that the standardized factor loadings ranged between .43 and .76 and these values were significant. These findings show that the factor loadings of the scale are within reliable limits (Tabachnick et al., 2013). In addition, it was detected that the Turkish form of the inventory had an excellent fit in the SRMR fit index and an acceptable fit value in other indices. These findings regarding CFA show that the Turkish form of the inventory provides a valid structure (Byrne, 2010; Hu & Bentler, 1999). However,

since the CFA results of the original form of the inventory were not reported (Balcıkanlı, 2011), a comparison between the results attained and the results of the original form could not be made. To test the internal validity of the Turkish form, the correlation of the subfactors of MAIT with the whole inventory was analyzed. The analysis revealed a positive, strong, and statistically significant correlation between the total inventory score and the scores of each factor. There is a medium-level significant correlation between each factor. These results can be accepted as an indicator that each factor accurately represents the inventory's overall structure.

Within the framework of reliability assessment for the scale, computations were undertaken for item discrimination values, internal consistency coefficients, and item-total correlations, both for the total scale and its six subdimensions. The detected values entirely substantiate the scale's reliability as a dependable measurement instrument. Specifically, McDonald's ω coefficient for the Turkish version of the inventory was designated to be .94. Moreover, McDonald's ω coefficients for the six subdimensions of the inventory displayed a range from .63 to .77 criterion. The reliability coefficients obtained indicate that reliable results can be acquired in measurements made with MAIT (Bernardi, 1994; Buyukozturk, 2010, s. 171). The item-total correlation coefficients of the scale ranged from .49 to .75. Consequently, it can be claimed that each item is consistent with the whole scale (Sonmez & Alacapınar, 2018, s. 215). According to the 27% lower-upper group item discrimination values of the inventory, it was determined that each scale item had discriminative properties. In the light of the attained results, it has been established that the Turkish version of the MAIT, as conceptualized by Balcıkanlı (2011) (refer to Appendix: 1), stands as a validated and dependable measurement tool.

The Turkish version of MAIT attained from this study is an inventory aimed at measuring teachers' metacognitive awareness related to their own teaching processes. Due to this focus, the Turkish version of MAIT inventory serves a different purpose compared to other measurement tools available in the Turkish literature that measure the metacognitive awareness of students (Cetinkaya & Erktin, 2002; Karatay, 2009; Ozyesil et. al., 2011), prospective teachers (Durdukoca & Arıbas, 2019), and adults (Akın, 2007). Besides, the Turkish version of MAIT differs from the metacognitive awareness inventories developed for teachers by Guzel and Basokcu (2023), and Kutluca et al. (2022) in terms of its six-factor structure. Guzel and Basokcu (2023) metacognitively designed "the teacher's own cognition" and "the teacher's class cognition" in the inventory they developed and then they generated two forms under the names of "teacher-self" and "teacher-class". Both forms are described with the subdimensions of control, goal and monitoring. The scale developed by Kutluca et al. (2022) has a triple structure comprising the subfactors of "monitoring and evaluating in-class teaching activities and their intellectual effectiveness", "evaluating the ways followed for the summative assessment of learner outcomes", and "metacognitive colleague interaction and exchange of ideas". On contrast, the Turkish version of MAIT has a six-factor structure (declarative knowledge, procedural knowledge, conditional knowledge, planning, monitoring and evaluation) based on the metacognitive awareness model of Schraw and Moshman (1995), which is one of the most powerful models in the literature for describing metacognitive awareness. From this point of view, the Turkish version of MAIT differs from other tools developed for teachers and created for measuring metacognitive awareness and occurs as an original measurement tool with a strong structure.

In addition, the practical implications of the research results has the potential to make significant contributions to the occupational development of teachers, thereby improving the quality of education and students. Teachers' metacognitive awareness of their own teaching process increases the quality of education in various ways. Teachers with high metacognition levels plan the teaching process effectively (Tsui, 2003), carry out monitoring activities successfully (Doganay & Ozturk, 2011), and evaluate the lesson process in a multidimensional way (Ozturk & Ozyurt, 2020). Moreover, teachers who are highly metacognitively aware of their own teaching processes can be impactful guides for their students (Demir & Doganay, 2008), can assess their students from different perspectives (Gelen, 2003), use instructional materials more efficiently and avoid mentioning redundant details during the teaching (Paris & Winograd, 2003). Furthermore, there are many studies

in the literature indicating that teachers have a critical role in enhancing students' metacognitive awareness (Cotton, 2010; Demir, 2009; Gelen, 2003; Senemoğlu, 2020). Students with high level of metacognitive awareness develop self-efficacy perception (Alcı et al., 2010; Oguz & Kalender, 2018), academic achievement (Bianchi, 2007; Bergstresser, 2013; Canca, 2005; Demir, 2009; Kummin & Rahman, 2010; Ozturk & Kurtulus, 2017; Pehlivan, 2012; Sawhney & Bansal, 2015; Young & Fry, 2008), problem-solving skills (Bars, 2016; Karakelle, 2012; Ozsoy, 2007), and motivation (Asık, 2009; Yangın, 2014). By pointing to direct and indirect reasons, all these research findings uncover how important it is for teachers to be metacognitively aware of their teaching. The Turkish version of the MAIT inventory allows for the assessment of teachers' metacognitive awareness regarding their instructional processes and enables identifying any possible deficiencies. In the following process of the detection stage, courses can be arranged for teachers to eliminate the determined deficiencies. In this respect, the research addresses a gap in the existing literature and practically contributes to teachers' professional development, the enhancement of K–12 educational quality, and the application-based support of student learning.

In addition to its contribution to the field of education, the study also has some limitations. The adaptation study of MAIT into Turkish was conducted with teachers. To measure the metacognitive awareness of pre-service teachers about their instructional processes, an adaptation study can also be conducted for this specific group.

Ethical Statements

This research was ethically examined and approved by the Gaziantep University Social and Human Sciences Ethics Committee.

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The authors have equally contributed to the research at all phases of the research.

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Conflict of Interest

The authors do not declare any conflict about the research.

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Appendix

Appendix 1. Öğretmenler İçin Bilişsel Farkındalık Envanteri

		Kesinlikle Katılıyorum (5)	Katılıyorum(4)	Kararsızım(3)	Katılmıyorum(2)	Kesinlikle Katılmıyorum(1)
1.	Öğretim sürecindeki güçlü ve zayıf yönlerimin farkındayım.					
2.	Daha önce işe yaramış olan öğretim tekniklerini kullanmaya çalışırım.					
3.	Öğretim sürecindeki zayıf yönlerimi telafi etmek için güçlü yönlerimi kullanırım.					
4.	Ders işlerken yeterli zamana sahip olmak için hızımı ayarlarım.					
5.	Ders işlerken öğretim hedeflerime ulaşıp ulaşmadığımı ara ara kendime sorarım.					
6.	Dersim bittiğinde öğretim hedeflerime ne kadar ulaşabildiğimi kendime sorarım.					
7.	İyi bir öğretmen olmak için en önemli becerilerin neler olduğunu biliyorum.					
8.	Sınıfta uyguladığım her öğretim tekniğini tercih etmemin belirli nedenleri vardır.					
9.	Ders anlatmam gerektiğinde kendimi motive edebilirim.					
10.	Dersten önce öğretim hedeflerimi belirlerim.					
11.	Ders işlerken kullandığım öğretim tekniğinin ne kadar işe yaradığını değerlendiririm.					
12.	Her öğretim deneyiminden sonra farklı teknikler kullanabilir miydim diye kendime sorarım.					
13.	Ne kadar iyi öğrettiğimi kontrol ederim.					
14.	Ders işlerken hangi öğretim tekniğini kullandığımın farkındayım.					
15.	Duruma göre farklı öğretim teknikleri kullanırım.					
16.	Kullanacağım öğretim materyalleri hakkında kendime sorular sorarım.					
17.	Ders işlerken, öğrencilerimin konuyu ne ölçüde anladıklarını düzenli olarak kontrol ederim.					
18.	Bir konuyu öğrettikten sonra gelecek sefer o konuyu daha etkili öğretip öğretemeyeceğime ilişkin kendimi sorgularım.					
19.	Bilmem gerekenleri biliyorum.					
20.	İşe yarayan öğretim tekniklerini otomatik olarak kullanırım.					
21.	Kullandığım her öğretim tekniğinin ne zaman daha etkili olacağını bilirim.					
22.	Öğretim hedeflerime en iyi şekilde ulaşmak için zamanımı düzenlerim.					
23.	Ders işlerken öğretimi ne kadar iyi yaptığıma ilişkin kendime sorular sorarım.					
24.	Dersim bittikten sonra tüm olası öğretim tekniklerini dikkate alıp almadığımı kendime sorarım.					

Faktör 1: Deklaratif bilgi (1,7, 13 ve 20. maddeler)
Faktör 2: Prosedürel bilgi (2, 8, 14 ve 14. maddeler)
Faktör 3: Koşullu bilgi (3, 9, 15 ve 21. maddeler)
Faktör 4: Planlama (4, 10, 16 ve 22. maddeler)
Faktör 5: İzleme (5, 11, 17 ve 23. maddeler)
Faktör 6: Değerlendirme (6, 12, 18 ve 24. maddeler)