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A Case Study of an Ignored Facet: Metacognitive Experiences

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Abstract

Metacognitive experiences, a component of metacognition, may have distinctive characteristics at each instance, and they help relate and practice metacognitive knowledge and strategies. This case study examines pre-service teachers' task-specific metacognitive experiences and strategic planning performances. Data were collected from 187 volunteers via four different tasks with compatible demands and the Metacognitive Experiences Questionnaire, delivered before and after task completion. The reasons behind task selection were coded thematically, and performance scores were coded regarding the complexity of strategic planning. Findings confirmed that strategic planning performance did not vary across tasks, reasons, or class levels. Moreover, while the data did not fit the theoretical model of the Metacognitive Experiences Questionnaire, an exploratory factor analysis produced a three-factor solution for task-specific metacognitive experiences. Task-specific metacognitive experiences in this study may be represented by metacognitive estimates, feelings, and judgments, and they explained 59.5% of the variance. Post-task correctness and confidence judgments were significant predictors. While correctness judgments may facilitate performance, confidence may impose false adequacy judgments, implying the Dunning-Kruger effect.

Keywords: Metacognitive experience, task-specific performance, confidence judgments, Dunning-Kruger effect.

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Introduction

Metacognition pertains to thinking about cognition. According to Flavell (1979), cognition can be controlled through the actions and interactions of various components including knowledge, strategies, and experiences. Metacognitive knowledge relates to knowledge about self, task demands, goals, and strategies, and it is considered a part of one's belief system that is often derived from previous experiences (Veenman et al., 2006). Metacognitive strategies, on the other hand, are the means of planning, monitoring, regulating, and evaluating cognition (Flavell, 1979; Veenman, 2016). Metacognitive strategies are intentional, and individuals "consciously and purposively" use them (Efklides, 2009, p.79). As Flavell (1976) argued cognitive strategies facilitate learning while metacognitive strategies help regulate cognitive processes. That is, cognitive and metacognitive functions co-exist and are interchangeable (Georghiades, 2004). Metacognitive experiences through which individuals participate in highly conscious thinking (Flavell, 1979) are concurrent and self-initiated (Aşık & Erktin, 2019). During metacognitive experiences, metacognitive knowledge becomes explicit, and regulatory strategies are deliberately used (Flavell, 1979). However, although they are related to metacognitive knowledge and strategies (Flavell, 1979), they are not encompassed by them (Efklides, 2006a; Efklides 2008).

Metacognitive Experiences

Metacognitive experiences (ME) "are the interface between the person and the task" (Efklides, 2008, p.279) and "can be considered self-judgments and self-reactions in the cognitive domain" (Efklides & Tsiora, 2002, p.223). Metacognitive experiences are personal (Aşık & Erktin, 2019) and provide individuals with feedback on their capability to manage a particular task, meet task demands, and judge one's causal attributions of ability, effort, and task difficulty (Efklides & Tsiora, 2002). Metacognitive experiences differ from metacognitive knowledge or skills as they exist in the working memory, specific in scope, and cognitively and affectively charged (Efklides, 2006a).

Table 1.
Components of Metacognitive Experiences

Components	Indicators
Metacognitive awareness	Task demands, Fluency in cognitive processing, Progress towards goals, Efforts for cognitive processing, Outcome of cognitive processing.
Metacognitive feelings	Knowing, Familiarity, Confidence, Difficulty, Satisfaction.
Metacognitive judgments	Judgement of learning, Estimate of effort, Estimate of time, Judgement of solution correctness.
Task-specific knowledge	Task characteristics (i.e., features, demands, strategies) Ideas, Thoughts, Procedures for the task.

ME pertains to one's awareness, feelings, estimations, judgments, and online task-specific knowledge (see Table 1, Efklides, 2008; Pimvichai et al., 2019). Awareness relates to an awareness of task demands, fluency of cognitive processing, progress towards goals, effort for cognitive processing, and the outcomes (Efklides, 2008). This aspect inherently activates metacognitive strategies to manage specific task demands inside a specific context. Moreover, other aspects like metacognitive feelings and judgments support these processes. Metacognitive feelings, on the other hand, refer to feelings of knowing, familiarity, and confidence besides feelings of difficulty and satisfaction (Efklides, 2008).

As metacognitive feelings are products or signals of continuous monitoring of cognition (Efklides, 2002b, 2009), they inform individuals about control decisions (Efklides, 2009). They are characterized by personal relevance; in this sense, they have a character with positive or negative valance (Efklides, 2002b). Furthermore, metacognitive judgments or estimates apply to the judgment of learning, the estimate of effort, the estimate of time needed, and the estimate of solution correctness (Efklides, 2006a). (Efklides, 2002b). Finally, online-task-specific knowledge pertains to task information, ideas, thoughts, and procedures about the task. This set of conscious and analytic knowledge (Efklides, 2006a) may help individuals benefit from metacognitive knowledge they used in the past and help them do comparisons of the current task or others' cognitive processing (Efklides, 2008). To Efklides (2006a), components of metacognitive experiences are non-conscious and non-analytic inferential processes except for task-specific knowledge.

Assessment of Metacognitive Experiences

The debate of assessing metacognitive knowledge or skills (Ozturk, 2017) concerns metacognitive experiences. In her numerous works, Efklides provided different methodologies. For example, Efklides (2002a) stated that one can focus on *only one* ME or else, multiple manifestations of *the same* cognitive processes related to *the same task*. In the same vain, Aşık and Erktin (2019) recently confirmed that *a* specific task may be sufficiently explanatory to examine the role of metacognition on performance. Efklides (2002a) also suggested using independent measures that capture several aspects of cognitive processing and might not be necessarily related to the same task can also be employed.

Metacognitive experience may be examined via two methodologies (i.e., self-report offline measures and think-aloud protocols). An example of a self-report offline measure is the Metacognitive Experiences Questionnaire (MEQ). Efklides, (2002a) developed the MEQ to measure individuals' judgments and feelings (a) before they execute cognitive processes for task demands, and (b) after they complete task demands. For prospective measures, one can be asked questions regarding the familiarity and feelings of liking or difficulty of the task, as well as the effort, time, and accuracy of the cognitive processing for task demands. An understanding of metacognitive experiences at two phases is important because at each phase, different mechanisms may underline the cognitive process and also, measures at each phase may provide evidence for the reliability and validity of the reported experiences (Efklides, 2006b). Efklides (2002a) suggested using a 4-point scale to measure items on the MEQ ranging from 1 (not at all) to 4 (very).

As to the effectiveness of the MEQ, Efklides (2002a) emphasizes the importance of distinguishing between metacognitive knowledge (ideas) and experiences (feelings and judgments) because they come from different domains and serve different functions. Therefore, she proposes a multi-factor model that distinguishes prospective, retrospective, cognitive processing, metacognitive feeling, and metacognitive judgment items loading differently by task difficulty. Efklides conducted a series of studies to assess the reliability of the MEQ. These studies highlighted a distinction between prospective and retrospective reports as well as metacognitive experiences and knowledge while reliability varied (Efklides, 2002a). In a collective report, Efklides (2002a) stated that prospective reports had a lower α, and metacognitive experiences had a higher α than metacognitive knowledge. She stated that task difficulty affected the reliability of the MEQ; however, when both retrospective and prospective parts were taken, the reliability of the scale was satisfactory (.80).

Individuals' cognitive activity may also be reached by online measures such as think-aloud protocols (Efklides, 2006b). Think-aloud enables one to make covert mental processes explicit during cognitive enactments (Baumann et al., 1992; Garner, 1987). However, it is important to supplement other measures such as behavioral (e.g., the direction of gaze, facial expressions, body movements, verbal utterances, use of technical strategies, use of help from others) and performance measures (i.e. outcomes) with this protocol (Efklides, 2006b). This is because think-aloud may indeed impose limitations on individuals' cognitive processing or impact outcomes while individuals may focus on expressing cognitions verbally (Oguz & Sahin, 2011). Moreover, they may seek external feedback on their cognitive processing while engaging in thinking aloud. Individuals may alter their behavior in response to the cues from the researcher, or if no cues are present, participants might still attempt to give a response that is limited or socially acceptable. Also, such protocols are not typical practices; thereby, they might be detrimental to learning or cognitive processing (Oguz & Sahin, 2011).

Research on Metacognitive Experiences

Research on metacognitive experiences (ME) is limited compared to the other domains of metacognition. The extant studies provide insights into understanding metacognitive feelings, judgments, and their impact on performance. Although the theory presents components of metacognitive experiences distinctively for clarity, the directions or predictive power may not be obvious. This is because each task has unique demands, and each person may activate different sets of metacognitive repertoires. Previous studies highlighted that metacognitive knowledge may predict performance and it may be explored via various components of metacognitive experiences (e.g., Aşık & Erktin, 2019; Dindar et al., 2020; Efklides, 2002b, 2006a; Efklides et al., 1999; Efklides & Tsiora, 2002). In this sense, ME could act as a mediating factor in the relationship between performance and metacognitive knowledge (Aşık & Erktin, 2019), and they may be influenced by performance (Efklides & Tsiora, 2002).

While the components of ME may operate differently, judgments of confidence, estimates of effort, task interest, and the feeling of satisfaction may contribute to performance (Dindar et al., 2020; Efklides, 2002b; Efklides & Petkaki, 2005). Indeed, when individuals engage in familiar tasks or tasks they are interested in, they might feel more confident and satisfied with the products (Efklides, 2002b). It may be also that interest and the feeling of liking may be related to a positive mood (Efklides & Petkaki, 2005), and at such times individuals may feel more confident with their efforts and actions (Dindar et al., 2020). Moreover, while the feeling of confidence may be predicted by the feeling of satisfaction (Efklides & Petkaki, 2005) and estimates of effort (Dindar et al., 2020), both satisfaction and confidence with task completion or goal attainment might be traced via estimates of effort and solution correctness (Efklides, 2002b). On the other hand, the feeling of difficulty that changes at different stages of task performance may not directly relate to performance (Efklides et al., 1999); yet, it can predict a prospective estimate of effort (Efklides, 2006a). When the task is perceived to be difficult, individuals might put more effort into completing task demands or meeting goals. Besides, external feedback can lead to underestimated effort or the feeling of difficulty because individuals can feel more secure with their processes (Efklides & Dina, 2004). Furthermore, when individuals experience a feeling of liking, interest, or positive mood, the feeling of difficulty may be eliminated (Efklides & Petkaki, 2005).

Rationale and Purpose of the Study

There is a bi-directional link between metacognitive knowledge and strategies, and it may be mediated by metacognitive experiences (Melot, 1998). Metacognitive experiences, however, have different characteristics or cues at each instance (Efklides, 2014). In this sense, the influence of different variables such as personal characteristics (i.e. competence in a domain, learning goals, interest, mood, and self-concept) (Efklides, 2006b; Efklides et al., 2006), contextual cues or dynamics, and specific task features (Efklides, 2014) require further exploration. Thereby, any attempt to analyze the needs and competencies of metacognition as well as develop metacognition interventions may be released from designers' judgments about novices' competencies (Efklides, 2008). In this regard, this study aims to examine a task-specific metacognitive experience and participants' strategic planning performance. This study will answer the following questions,

1. Are there any differences among participants' strategic planning performances regarding task choices, reasons, and class levels?
2. How does the Metacognitive Experience Questionnaire reflect a task-specific metacognitive experience?
3. What does a task-specific metacognitive experience model include?

Method

Research Design

This case study explored the nature of task-specific metacognitive experiences with young adults in Türkiye. For this purpose, quantitative methodologies were employed. Initially, a comparative analysis was run to explore differences in individuals' strategic performances regarding their task choices, reasons, and class level within the context of teaching. As each variable is unique, a confirmatory and then, an explanatory factor analysis was run to examine the components of task-specific metacognitive experiences. Finally, a path was developed for the task-specific metacognitive experience.

Participants

Participants came from a state university on the west coast of Turkey. At the time of the study, they studied at the College of Education, department of English Language Teaching (ELT). In total, there were 187 participants. Of those, 55 were freshmen, 45 were sophomores, 47 were juniors, and 40 were seniors. Participants were recruited via convenience sampling and on their voluntary participation as well as consent. They were provided with an informed consent form before the data collection and explained their rights. They were not provided with any kind of incentives for their participation.

Data Collection Tools and Procedures

Human cognition is highly influenced by the immediate context in which the task is situated (Schwarz, 2010); similarly, metacognitive experiences are influenced by the characteristics of a context (Efklides, 2006a). Specifically, in schools, metacognitive experiences may pertain to academic self-concept that represents one's competencies in the cognitive or academic domain (Efklides & Tsiora, 2002). Therefore, in this study, the author developed four different tasks regarding participants' majors, teaching English as a foreign language.

Each task included one familiar component (teaching English as a foreign language) and one unfamiliar component (attention deficit hyperactivity disorder; ADHD). The first task pertained to giving a speech to elementary school teachers on English language teaching to students with ADHD. The second task was to increase the effectiveness of the instruction via materials for ADHD English language learners. The next task demanded participants to create a scenario that shows the problematic interactions of an ADHD student with his peers and teacher in an English classroom. The last task asked the participants to help an ADHD English learner's low reading performance because they were preparing for a national exam that did not cover English. The tasks and their compatibility were confirmed by an expert in the field.

For task-specific metacognitive experiences, the MEQ with a scale ranging from 1 (not at all) to 4 (a lot) was employed for prospective and retrospective use (Efklides, 2002a). The prospective section included items of the feeling of familiarity, estimates of frequency, estimates of recency, the feeling of liking, the feeling of difficulty, estimates of effort, estimates of time, judgments of solution correctness, judgments of need for time, judgments of strategy use, the feeling of confidence, and judgments of time. On the other hand, retrospective items included all except for the feeling of familiarity, estimates of frequency, and estimates of recency; however, it included the feeling of satisfaction.

For data collection, first ethics permission was granted from the Izmir Democracy University, Social and Human Sciences Research and Publication Ethics Committee (Doc No: 2021/64). Then, participants were provided with four tasks and the MEQ. They were asked to choose one task. After participants chose the task, they were directed to fill in the prospective part of the MEQ and state their reasons for the choice. Following these, they were asked to develop a strategic plan. After they finished their plans, they were asked to fill in the retrospective part of the MEQ.

Data Analysis Procedures

The relationship between task choices, reasons, class levels, and performance was analyzed by chi-square tests. Cramer's V was calculated when there was a significant correlation. For this procedure, initially, participants' task choices and reasons to engage in the chosen task were analyzed thematically. The reasons were classified under five categories. The codes and themes were as in the following:

- *Affective task features:* Participants think that the task is meaningful, interesting, engaging, motivating, fun, appealing, and important.
- *Helping others:* Participants think that the task makes them good, want to help colleagues or students, and make it suitable for everyone.
- *Confidence:* Participants think that the task is easy and that they can solve it.

- *Professional goals:* Participants think that such problems may occur in future classes, or they want to learn about this task for future classes.
- *First-hand experiences*: Participants experience the same symptoms or interact with someone in their environment who suffers from the same symptoms, or they helped people with those symptoms.

Participants' strategic planning responses were graded by the author at two intervals, α.95. For this task, the following was adopted; (1) the participant provided no solid or meaningful answer, (2) the participant constructed a course of action, (3) the participant adopts the indicators of 2 and considers any alternatives or strategies, (4) the participant adopts the indicators of 3 and considers evaluating the course of action. On this basis, participants' performance scores were analyzed for any differences across the class levels, tasks, and interests via the MANOVA test.

The MEQ items were analyzed for their contribution to the variance regarding a task-specific metacognitive experience. For this purpose, a confirmatory factor analysis was performed on the MEQ. Because I hypothesize that although the MEQ is delivered prospectively and retrospectively (Efklides, 2002a), participants' metacognitive acts, indeed, need to be captured holistically as initial judgments and feelings may impact both task management and retrospective judgments and feelings. Moreover, metacognitive experiences have unique characteristics regarding the task and the agent. In this sense, the MEQ was also examined via an exploratory factor analysis (EFA) on SPSS 22. Following the EFA, a structural equation modeling (SEM) was performed on LISREL 12 to examine a model where performance was the dependent variable regarding the task-specific MEQ.

Findings

The Relation of Task Choice, Reasons, and Performance

Participants' task selection and reasons were inconsistent. In this group, task 2 (materials design, *N*=100) and task 4 (helping with reading performance, *N*=56) were dominantly chosen (Figure 1). Participants also chose task 1 (giving a speech, *N*=18) and task 3 (creating a scenario, *N*=13). Participants' reasons for their task selection also varied (Figure 2). They pertained to confidence (*N*=68), helping others (*N*=40), individual experiences (*N*=32), features of the task (*N*=25), and professional goals (*N*=22). Regarding these two variables, their performance scores were analyzed and they did not vary across different (a) class levels $x^2(9)= 14.8$, $p= .09$, (b) tasks $x^2(9)= 14.1$, $p= .117$, and (c) reasons $x^2(12)= 17.5$, $p= .132$. Moreover, there was no statistical association between task choices and (a) class levels ($x^2(9, 187) = 8.71$, $p > .47$) as well as (b) reasons ($x^2(12, 187) = 11.4$, $p > .50$).

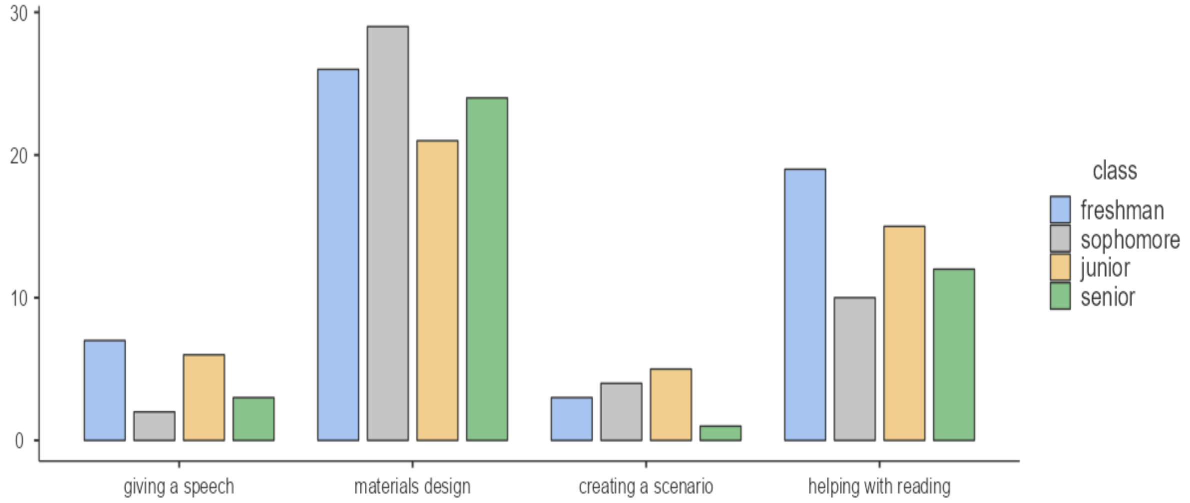

Figure 1. Task Choice by Classes

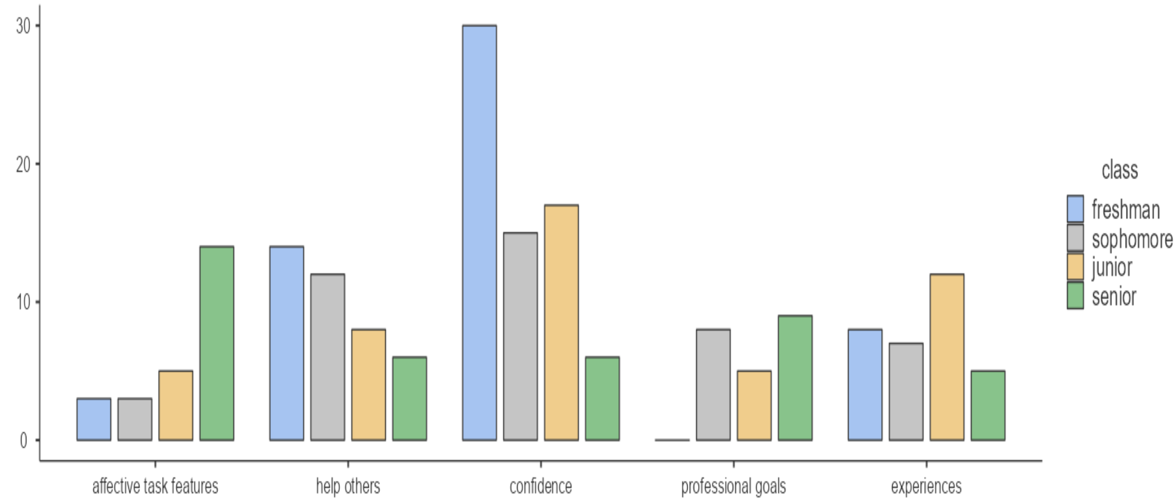

Figure 2. Reasons by Classes

Metacognitive Experience Questionnaire Structure: General vs. Task-Specific

A confirmatory factor analysis was run to test the theoretical 4-factor solution of the MEQ. The analysis confirmed that the theoretical model might not be a plausible one (x^2(224) =930, *p*<.001). Its fit measures were also problematic (Table 2).

Table 2.

Fit Measures for Theoretical MEQ

				RMSEA 90% CI			
CFI	TLI	SRMR	RMSEA	Lower	Upper	AIC	BIC
0.460	0.391	0.159	0.130	0.121	0.139	10257	10499

As the theory of metacognition proposes metacognitive experiences are concurrent experiences where each individual utilizes metacognitive knowledge and strategies regarding the specific task features, an EFA was performed to test whether prospective and retrospective metacognition might not be separated from each other. Before running an EFA, Kaiser-Meyer-Olkin (KMO) and Bartlett's test of Sphericity were examined. The factorability adequacy of sampling was satisfactory with a KMO= .74 and Bartlett's test of sphericity was significant (x^2 (253)=1483, *p* <.001). Then, the principal component and Monte Carlo parallel analyses were run, and a 3- 3-factor solution was tested with 23 items. The items that did not load on any factors were subtracted initially, and items with factor loadings over .4 were retained. Moreover, the theoretical understanding of metacognitive experiences was regarded. Following these steps, the final model that employed minimum residuals extraction with oblimin rotation produced a significant solution (x^2(12)=11.6 *p*=.477, *RMSEA*=.00, *RMSEA 90%CI*=.07, *TLI*=.1) with 9 items and 3 factors as seen in Table 3. The factors may be named metacognitive estimates (ME; 3 items that include estimates of post-confidence, post-correctness, and post-satisfaction), metacognitive feelings (MF; 3 items that include pre-frequency, pre-familiarity, and pre-recency), and metacognitive judgments (3 items that pertain to judgments of post-effort, post-difficulty, and post-time).

Table 3.
Factors for Task-Specific MEQ

	Factors			
	Metacognitive Estimates	Metacognitive Feeling	Metacognitive Judgements	Uniqueness
PostConfidence	0.835			0.317
PostCorrectness	0.748			0.432
PostSatisfaction	0.711			0.455
PreFrequency		0.822		0.333
PreFamiliarity		0.779		0.365
PreRecency		0.695		0.504
PostEffort			0.898	0.170
PostDifficulty			0.731	0.469
PostTime			0.610	0.602

These factors explained 59.5% of the variance. The factors' unique contribution was almost equal; ME= 20.3, MF=20, and MJ=19.3. Cronbach's α was calculated for each dimension. It was found .81 for ME, .80 for MF, and .78 for MJ.

Task-Specific Metacognitive Experience and Performance

A structural equation modeling was performed for a task-specific metacognitive experience. The factor loadings were greater than the absolute value of .7 except for post-time and post-difficulty. However, their loadings were close to the threshold in determining the latent variables. CHIN/df was 1.14 and the fit indices were satisfying as in the following; *RMSEAp*=.89, *CFI*=.99, *TLI*=.99, *NFI*=.91. The model fit was adequate $x^2(27)=31.4$, p=.395, and it explained 2.7% of the variance in performance. However, MF (p=.47), ME (p=.14), and MJ (p=.72) were non-significant predictors.

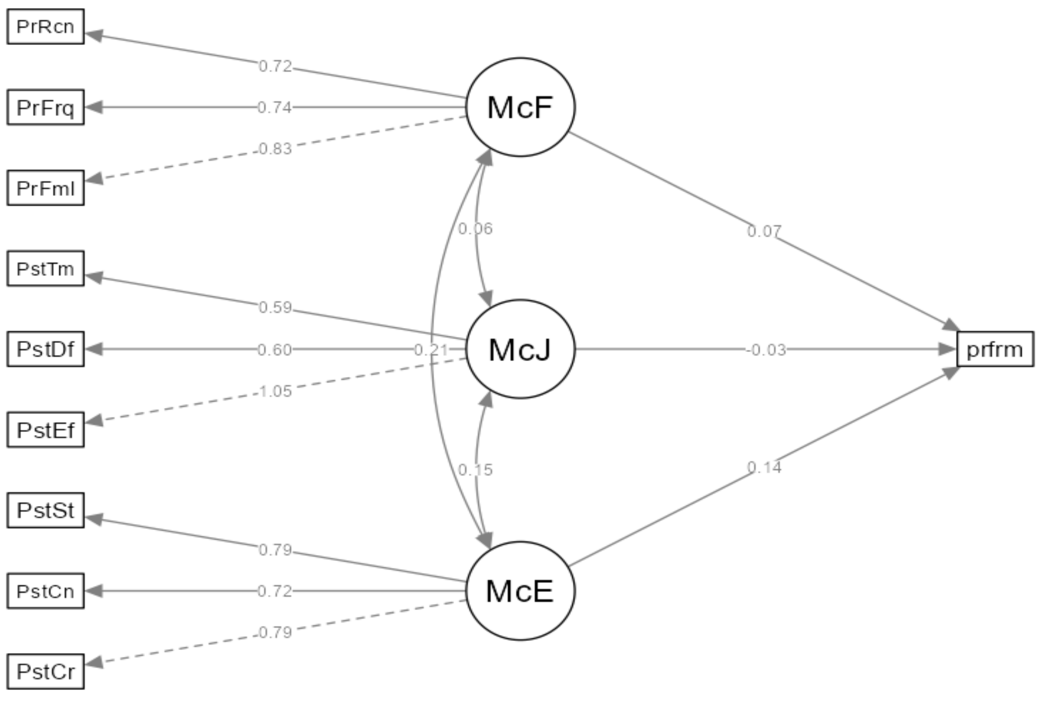

Figure 3. A Task-Specific Model of Metacognitive Experience

Although the model fits, it might not help explain each indicator. Thereby, different iterations of ordinal logistic regression were run. The full model where all items of ME, MF, and MJ were included produced a nonsignificant model x^2 (9)=16, *p*=.06, and on this model post-confidence (*p*=.005) and post-correctness (*p*=.003) were significant predictors. Regarding the loadings of each item, one item (post-time) with a .59 loading was removed, and a final ordinal logistic regression including ME, MF, post-effort, and post-difficult was run. The model predicting performance was significant, x^2 (8)=16, *p*=.04. In this model, post-correctness (x^2 (1)=9.5 *p*=.002) and post-confidence (x^2 (1)=7.2 *p*=.005) were significant predictors. Indeed, as also seen in Figure 4, post-confidence and post-correcteness were correlated (*r*(185)=+.601, *p*<.01), and performance might increase .9 with one unit increase in post-correctness and might decrease .6 with one unit increase in post-confidence (x^2 (2)=12.7, *p*=.002, *E*(postcorrect)=.88, *E*(postconf)=-.56).

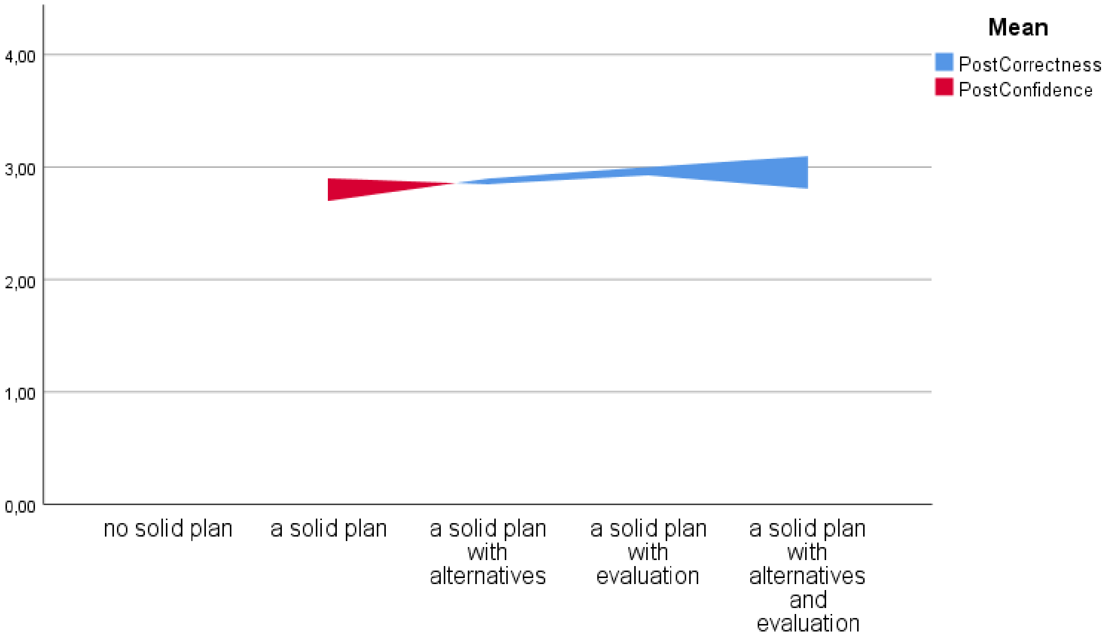

Figure 4. Performance by Correctness and Confidence

Discussion and Conclusion

Studying metacognitive experiences may not be straightforward because managing any divergencies with task features, individual differences, or contextual characteristics may not be always plausible or realistic. In this study, a task-specific metacognitive experience in the context of EFL pre-service teacher education in western Turkey was examined. Although higher-order thinking performances represented by strategic planning did not show any variations across different tasks, reasons, or class levels, it might be impacted in a case where task demands were not compatible. That is, as Efklides (2014) stated each task with different features or demands would provide different cues for task completion and activate different schemas; thereby, they can create a different experience for each person. Moreover, although research has not sufficiently explicated the influence of the context on metacognitive experiences, it may also bear some barriers or opportunities to higher-order thinking. For example, in a previous study, pre-service teachers reported that they, most of the time, were exposed to negative reactions when they said *I am thinking*. In this specific context, educational practices and cultural reminisces may not help promote thinking to the best (Ozturk, 2022). In this sense, just like cognitions are influenced by the task context (Schwarz, 2010), metacognitive experiences may be also impacted by any variables of

Another distinctive finding of this study confirms the theoretical assumptions that metacognitive experiences are unique and specific in scope (Efklides, 2006a). Components of metacognitive experiences in this study were measured via the MEQ (Efklides, 2002a), and the MEQ model in this study did not fit the theoretical measure. While the theoretical model recognizes four dimensions of ME as prospective and retrospective feelings, judgments, and ideas, this study adopted the experience as a full course after testing the theoretical model. This is because while feelings, judgments, and ideas may impact each other at any level, individuals might not separate prospective feelings, judgments, and ideas from retrospective ones until the task is completed. Indeed, prospective feelings, judgments, and ideas may set ground for the cognitive performance, and retrospective feelings, judgments, and ideas may set an overarching regulatory mechanism. That is, when a full course of the context and task-specific metacognitive experience is explored, it may be represented via metacognitive feelings, judgments, and estimates. Indeed, as metacognitive experiences are subjective interfaces between the person and task demands (Aşık & Erktin, 2019; Efklides, 2008), each person's perception of context and task demands; thereby, judgments of metacognitive experience would be different and produce different models at any instance.

Findings also highlighted an important aspect of metacognition; self-assessment. Although the theoretical model and model in this study recognize metacognitive feelings, estimates, and judgments, performance was predicted via cognitive features, specifically by confidence and correctness. While such a finding may align with Efklides and Tsiora's (2002) argument that metacognitive experiences can be considered self-reactions and judgments to the cognitions, those features relate to self-assessment. Self-assessment, as Afflerbach and Meuwissen (2005) stated, is a mind frame of metacognitive individuals. Because self-assessment is a collection of metacognitive knowledge and strategies (Afflerbach & Meuwissen, 2005), it may impact both the nature and the products of metacognitive experiences.

Judgment of correctness and confidence may relate to self-assessment and they can provide insights into the processes and products of the metacognitive experience in this study. However, their impacts would be different. Participants' perception of their correctness in meeting task demands may provide them with feedback in managing task demands strategically and facilitate self-evaluation. It may also help them feel confident with their processes as they may monitor it for correctness. However, such a finding might relate to a specific group of individuals who developed enough expertise. As Moore et al. (2017) emphasized, confidence and accuracy may be correlated, and people usually tend to make self-assessments "in the direction of overconfidence" (Miller & Geraci, 2011, p. 502).

Confidence, on the other hand, may be the most consequential bias to human judgment (Ehrlinger et al., 2008; Moore et al., 2017) regarding its ubiquity and role in facilitating other biases or errors (Moore et al., 2017) such as making poor decisions and inappropriate allocations, engaging in dangerous behaviors, or studying poorly (Callender et al., 2016). Research studies conducted by for example, Callender et al. (2016), Hall et al. (2016), Kruger and Dunning (1999), Miller and Geraci (2011), Tirso et al. (2019), and this study highlighted that it may be low performers who might tend to feel overconfident in their actual performances while their performance might be impacted, negatively even when they have sufficient self-knowledge (Miller & Geraci, 2011) or topic-knowledge (Händel & Dresel, 2018). Although individuals may be typically optimistic when they evaluate the quality of performance on intellectual tasks (Callender et al., 2016; Ehrlinger et al., 2008; Miller & Geraci, 2011), it may not be novices but experts, who developed awareness, knowledge, and insights via various task experiences and feedback (Callender et al., 2016; Ehrlinger et al., 2008; Hall et al., 2016), navigate their judgments adeptly while reducing overconfidence (Moore et al., 2017).

This finding, indeed, might relate to the Dunning-Kruger effect that hinges on the premise that "accurate appraisal of one's performance depends on the same skills required for accurate performance" (McIntosh et al., 2019, p.3). When individuals with a lack of self-awareness or metacognition assess their performances (Duignan, 2022) or the accuracy of their judgments (Wilcox, 2023), their confidence might exceed their strategic performances. As they may not possess the skills (McIntosh et al., 2019) or insight needed to recognize their deficits (Ehrlinger et al., 2008), they cannot recognize the quality of their performance (Kruger & Dunning, 1999). Thereby, they may do imperfect self-assessment (Duignan, 2022; Dunning, 2011; Kruger & Dunning, 1999) or become overconfident in their performance (Ehrlinger et al., 2008). This phenomenon may bear a dual burden for some individuals as Mazor and Fleming (2021) and McIntosh et al. (2019) stated. Individuals with a lack of metacognitive sensitivity or motivation toward their performance may tend to ignore some flaws and at the same time, they miss opportunities to improve their performance accuracy (Mazor & Fleming, 2021). That is when two burdens come paired and Kruger and Dunning (1999) call it *unskilled and unaware*. In this sense, Dunning-Kruger effect may relate to Veenman et al.'s (2006) arguments for metacognitive adequacy. Veenman et al., (2006) argued that although individuals can possess metacognitive competencies, some may still suffer from production deficiencies where people cannot utilize their metacognitive repertoire sufficiently.

Limitations and Recommendations

The findings in this study are limited to its context, task features, and participants' characteristics. That is, dispositions and habits of thinking may change across different versions of those variables or other variables such as gender. In this sense, findings may not be generalizable to any context.

Moreover, although participants were required to write down a strategic plan, they were not asked to perform these steps. Such enactment would be a different metacognitive experience and thereby, their competency would change. Furthermore, although the tasks designed for this study may be authentic, valid, and typical for teacher education programs, performance may change within a different subgroup of participants or in a different context as also argued by Händel and Dresel (2018). In those settings, participants' characteristics for example, personality, performances, previous experiences, knowledge, and self-concepts or contextual dynamics such as attitudes towards low performance, higher order thinking, or environmental factors would be different and thereby, produce different performance calibrations.

While those previous limitations may be managed successfully via iterations of research designs, I strongly suggest that how and why individuals produce metacognitive inaccuracies is to be examined. There is ample research highlighting the beneficiary effects of metacognitive training or the positive impacts of metacognitive competencies over learning, academic achievement, or task performances (Saenz et al., 2019): However, they might be biased as developing and managing metacognitive competencies might not be always easy (Callender et al., 2016). As Wilcox (2023) stated, metacognitive inaccuracy might happen for several reasons which pertain to the following; (a) individuals do not possess skills that are necessary for accuracy judgments, (b) they may lack motivational incentives for accuracy, (c) they may fail to track their previous accuracy, and (d) individual might not have motives or they might be biased to realize their inaccuracy. As I did not hypothesize that the data could produce such a finding while planning this study, data collection, or analysis section, I cannot estimate what the reason is for some participants' overconfidence. Thereby, explorations of any variables that impact a metacognitive experience may help with understanding the nature of metacognition.

Finally, the pedagogical recommendations of this study pertain to feedback that novices get for their judgments and performances. As Ehrlinger et al. (2008), Hall et al. (2016), Kruger and Dunning (1999), and Moore et al. (2017) highlighted, novices may do self-assessment, though imperfectly. In this sense, training them for metacognitive competencies from the starch may not be smart; however, it may be that they need feedback for their self-assessment (Ehrlinger et al., 2008; Miller & Geraci, 2011; Moore et al., 2017). As Callender et al. (2016) and Saenz et al. (2019) found when individuals are provided with feedback for their performances, their calibration of performances and judgments may improve. When novices can analyze the evaluation criteria and be explained why their performance cannot match the ideal level, they may get the opportunities to gain knowledge (Moore et al., 2017) and polish metacognitive competencies. When they can discuss their performances regarding the criteria and explain their rationale for their perceptions (Händel & Dresel, 2018), the Dunning-Kruger effect or metacognitive deficiencies can be ameliorated.

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Ethics statement: In this study, I declare that the rules stated in the "Higher Education Institutions Scientific Research and Publication Ethics Directive" are complied with and that I do not take any of the actions based on "Actions Against Scientific Research and Publication Ethics". At the same time, I declare that there is no conflict of interest, and all the responsibility belongs to the article author in case of any ethical violations.

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