Reliability and Validity of the Metacognitive Self-Regulation in Lecture Scale

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Abstract

Metacognitive self-regulation (MSR), as measured by one dimension of the *Motivated Strategies for Learning Questionnaire* (MSLQ; Pintrich, 1991), has proven to be one of the most useful constructs in educational research over the last thirty years. One important aspect of the MSR dimension of the MSLQ is that metacognition is assessed at the course level. The purpose of this study is to introduce a new more task-specific measure of metacognition, *Metacognitive Self-Regulation in Lecture* (MSR-L; Authors, 2022). The MSR-L has as its sole focus metacognition in lectures. Archival data for both undergraduate and graduate college students are used to demonstrate the instrument's reliability, factorial validity, stability, discriminant validity, and construct validity. The instrument's potential use in educational research is discussed.

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Abstract

Metacognitive self-regulation (MSR), as measured by one dimension of the*Motivated Strategies for Learning Questionnaire* (MSLQ; Pintrich, 1991), has proven to be one of the most useful constructs in educational research over the last thirty years. One important aspect of the MSR dimension of the MSLQ is that metacognition is assessed at the course level. The purpose of this study is to introduce a new more task-specific measure of metacognition, *Metacognitive Self-Regulation in Lecture* (MSR-L; Brady, 2022). The MSR-L has as its sole focus metacognition in lectures. Archival data for both undergraduate and graduate college students are used to demonstrate the instrument's reliability, factorial validity, stability, discriminant validity, and construct validity. The instrument's potential use in educational research is discussed.

Keywords : Metacognition, Self-Regulation, Measurement, Lecture, Metacognitive Self-Regulation in Lecture

Reliability and Validity of the *Metacognitive Self-Regulation in Lecture Scale*

Although Flavell (1979) introduced the term metacognition, Paul Pintrich (Pintrich et al., 2000; Pintrich et al., 1993) is largely credited for extending Flavell's work on metacognition to metacognitive processes. Pintrich's view can be captured in the idea that metacognition is both knowledge and a process. Metacognitive processes pertain to planning activities, monitoring learning, volitional control and self-regulation,

strategy selection, and allocation of resources. The metacognitive thought process moves from the visceral from the initial stimulus to thoughts about academic experience at hand, to strategy and action choice, and self-evaluation of the process. Metacognition can be viewed as part of Pintrich's career-long effort to create interventions that enhance self-regulatory processes (Schunk, 2005), that is, linking the learning process through self-regulation's role in motivation. This means the forethought and self-monitoring by the learner in the learning context are paramount to connecting the motivation and self-regulatory process.

When calling for more attention to scales designed to measure metacognition after creating the *Motivated Strategies for Learning Questionnaire* (MSLQ), Pintrich et al. (1993) stated developing scale items that reflect components of metacognition that are distinguishable from self-regulation and aspects of cognition, is necessary (Pintrich et al., 2000). Metacognitive self-regulation leads to the evaluation of the preparation activities used before class, thinking about whether enough time was spent preparing or studying, and considering or planning what could be done next time to improve. As more strategies are learned, the student can make choices about time use, which strategies are more helpful, judgments about the level of difficulty and how to participate in class. Pintrich and other scholars maintain that metacognitive strategies may generalizable across tasks (e.g., listening, reading) and domains (e.g., math, science; Pintrich et al. 1993).

The MSLQ and Metacognitive Self-Regulation

The gold standard for educational psychologists for defining and differentiating knowledge/process dimensions is the Anderson et al. (2001) revision of the original Bloom et. al. (1956) *Taxonomy of Educational Objectives* . According to Anderson et al., "an important distinction in the field is between **knowledge of cognition** and the **monitoring, control, and self-regulation of cognition** " (boldface in original, p. 51). In the revised framework, metacognitive knowledge has been added to the knowledge dimension and self-regulation has been related to the process dimensions. The process part of the framework differs from the original three components proposed by Pintrich (planning, monitoring, and regulating). On a practical level, this difference does not have implications for the measurement of metacognitive self-regulation because neither planning nor monitoring are a part of the Pintrich et al. (1991) measurement of metacognitive self-regulation. In fact, in his later descriptions of the MSLQ metacognitive self-regulation subscale, he purports to measure control and self-regulation (Pintrich et al., 2000).

The MSLQ (Pintrich et al., 1991, 1993), is a well-known, well-validated course-specific measurement tool that is available in the public domain. The MSLQ has been widely used by researchers to measure metacognitive self-regulation. While the current article is focused on the metacognitive self-regulation (MSR) subscale of the MSLQ, the MSLQ the questionnaire also includes measures of goal orientation (intrinsic and extrinsic), task value, control beliefs about learning, self-efficacy, test anxiety, rehearsal, elaboration, organization, critical thinking, time and study environment, effort regulation, peer-to-peer learning, and help-seeking (Pintrich et al., 1991).

Although Pintrich's MSLQ subscale is the most widely used measure of metacognitive self-regulation, it is limited to research on courses (Pintrich et al. 2000). The purpose of this study is to introduce a new measure that is task-specific and suited to intervention research in which the focus is metacognition as an outcome. The name of the measure is the *Metacognitive Self-Regulation in Lecture Scale*(Brady, 2022). Items that measure metacognitive knowledge were not included as part of this new scale. The measure has been used in three prior studies (Brady & Forest, 2018; Brady et al., 2013; Brady et al., 2020). The data from these studies are aggregated to examine the MSR-L's internal consistency reliability and validity.

Method

Participants

Participants (N = 313) included undergraduate and graduate learners in educational psychology and 1st-year physician assistant candidates. Only students who had no missing data were used in each analysis. IRB approval was sought and obtained to use the de-identified data from a series of studies conducted at a large

southwestern university. Demographic descriptions are shown in Table 1.

Table 1

Participant Demographic Characteristics by Study Groups

	Undergraduate	*Undergraduate*	*Undergraduate*	*Graduate*	*Graduate*
	2011	*2011*	*2011*	*2013*	*2014*
Groups	Summer	Fall Cohort	Fall Cohort	Fall Cohort	Fall Cohort
Participants	33	87	78	58	57
Age Mean	18.03	18.31	18.37	26.3	25.4
18 - 22	33	87	89	--	--
23-40+	—	—	—	49	54
Gender M/F	18/15	44/42	42/34	43/11	47/9
Race/Ethnicity					
African American	9	11	20	5	1
Asian	1	6	11	10	17
Latino	18	4	6	9	6
White	1	50	26	25	28
Biracial	2	9	7	—	—
Multiracial	1	4	5	—	—
Other	1	2	3	4	4

Procedure and Instrumentation

Data from three studies (Brady & Forest, 2018; Brady et al, 2013, 2020) on metacognition and feedback methods were combined. In the three studies, a repeated measures design was used to compare treatment (an anonymous feedback system) and comparison (a public feedback system) conditions. The Metacognitive Self-Regulation Subscale (MSR) was given at the beginning and end of each course. The Metacognitive Self-Regulation in Lecture scale (MSR-L) was given following both public and anonymous feedback interventions. Thus, a total of four assessments were made. Items on both the MSR and MSR-L queried respondents using a 1(Not at all true of me) to 7 (Very true of me) continuum. Scale composites were created using item averages.

Metacognitive Self-Regulation Scale

Metacognitive self-regulation (MSR) was measured using a 15 items subset of the *Motivated Strategies for Learning Questionnaire*(MSLQ; Pintrich et al., 1991, 1993). Pintrich and his colleagues define metacognitive self-regulation as having three basic processes (planning, monitoring, and regulation), but only self-regulation is measured. Examples of items that measure metacognitive self-regulation are shown below.

- *I treat the course material as a starting point and try to develop my own ideas about it.*
- *When I read or hear an assertion or conclusion in this class, I think about possible alternatives.*
- *When I am confused about something I'm reading for this class, I go back and try to figure it out.*

Two of the fifteen items on the MSR (items 6 and 12) were removed to enhance the scale's internal consistency reliability and factorial validity. Both items required scoring reversals. Thus, the final scale was a composite of item averages for 13 items.

Metacognitive Self-Regulation in Lecture Scale

The current version of the metacognitive Self-Regulation in Lecture (MSR-L) was developed by Brady (2022). The scale has been revised for this article, but the updated version presented in Appendix A is like the original. Items were based on Mokhtari and Reichard's (2002) measure of metacognition awareness of reading strategies. The MSR-L has 12 items. Sample items are shown below:

- _____*helps me to know what questions to ask when the lecture topic is difficult*
- _____ *helps me see how the lecture material fits with the text.*
- _____ *helps me decide on key concepts and keywords to write in my lecture notes.*

The initial part of each question is where researchers can identify the strategy that is hypothesized to influence metacognitive self-regulation. Examples include test feedback, goal setting, planning, organizing, etc. Although the focus of the MSR-L is the lecture, the focus can be changed according to the study's purpose. This is easily accomplished by changing the word "lecture" to a different context (e.g., assignments, lab activities, readings, etc.).

Results and Discussion

Reliability Analysis

Initially, we analyzed 15 metacognitive self-regulation items using item-remainder correlations. The total number of cases was 190. Two items that were reverse-scored were eliminated due to low item-remainder correlations. A third item was eliminated because of content validity considerations. Statistics for the final scale are shown in Table 2. The item means range from a low of 3.26 to a high of 4.29 on a scale of 1-7. Item-remainder correlations ranged from a low of .554 to a high of .739, suggesting that the 12 items measured a single construct. Cronbach's alpha (internal consistency reliability) equaled .926. Thus, the *Metacognitive Self-Regulation in Lecture Scale* (MSR-L) is a highly reliable scale that measures a unitary construct.

Table 2

Item Statistics: Item-Remainder Correlations

	M	*SD*	Item-Remainder Correlation
MSRL1	3.609	1.523	.714
MSRL2	4.213	1.599	.701
MSRL3	3.502	1.494	.738
MSRL4	2.959	1.384	.626
MSRL5	3.888	1.431	.739
MSRL6	3.436	1.485	.729
MSRL7	3.523	1.331	.672
MSRL8	4.203	1.399	.554
MSRL9	3.634	1.421	.694
MSRL10	4.294	1.476	.714
MSRL11	4.228	1.579	.711
MSRL12	3.264	1.359	.627

Note. Cases were excluded listwise, N = 190

Discriminant Validity

Because the 12 items on the *Metacognitive Self-Regulation in Lecture Scale* (MSR-L) are like the 13 items on the *Metacognitive Self-Regulation Subscale* (MSR) of the *Motivated Strategies in Learning Questionnaire* (MSLQ), it is important to demonstrate that our new scale is sufficiently different than Pintrich's widely used metacognitive self-regulation subscale. If not, the introduction of a new scale is not warranted. A principal components extraction with an orthogonal rotation was used to access the discriminant validity of the MSR-L scale. Results are shown in Table 3. The extraction was limited to two components because two components, metacognitive self-regulation in lecture (MSR-L) and metacognition at the course level (MSR) were hypothesized. Table 3 shows only loadings that are greater than .200 to make the rotated component matrix easier to read. The first component clearly is identified as measuring metacognitive self-regulation in lecture and the second component as measuring metacognitive self-regulation at the course level. Thus, the discriminant validity of our new scale is demonstrated.

Table 3

Rotated Component Matrix	*Rotated Component Matrix* Component 1	*Rotated Component Matrix* Component 2
MSR1		.523
MSR2		.555
MSR3		.744
MSR4		.646
MSR5		.616
MSR6		.686
MSR7		.477
MSR8		.467
MSR9		.690
MSR10		.511
MSR11		.577
MSR12		.586
MSR13		.445
MSRL1	.755	
MSRL2	.742	
MSRL3	.780	
MSRL4	.667	
MSRL5	.802	
MSRL6	.783	
MSRL7	.737	
MSRL8	.580	
MSRL9	.746	
MSRL10	.769	
MSRL11	.735	.673
MSRL12		

Note. Cases were excluded listwise, N=129.

Distribution of MSR-L Scores

Item-averages were used to compile 190 composite scores. The distribution of scores is shown in Figure 1. The mean of the sample is 3.72 and the standard deviation is 1.08. The skewness statistic is .197 (SE=.172). Scores are slightly skewed to the low side, but the degree of skewness is only slightly more than one standard error. The kurtosis is .362 (SE=.343). The distribution of scores is flatter than a normal distribution but the kurtosis is only slightly more than one standard error. The skewness and kurtosis statistics suggest the distribution of scores for the MSR-L is only slightly different than a normal distribution, and accordingly warrant analyses using ordinary least-squares regression.

Figure 1

Distribution of MSR-L Scores

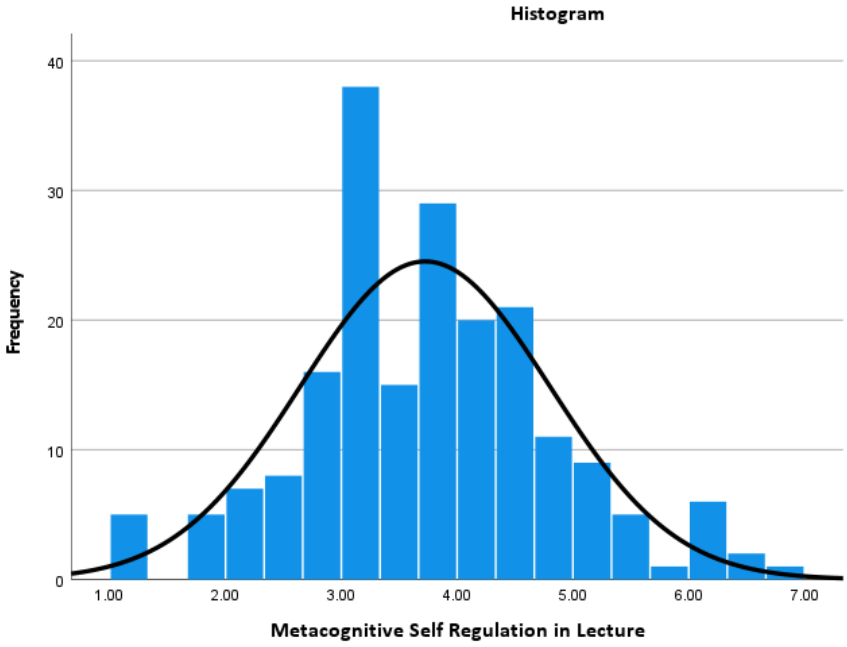


Table 4

Test-Retest Correlations [ab] *between Metacognitive Self-Regulation and Metacognitive Self-Regulation in Lecture.* *Test-Rete*

MSR1
MSR2
MSR-L1
MSR-L2

Note. [a] Correlation is significant at the 0.05 level (2-tailed).[b] Listwise deletion, N=124. *Note.* [a] C

Stability and Scale Intercorrelations

The fact that both the MSR (meta-cognitive self-regulation at the course level) and the MSR-L (meta-cognitive self-regulation in lecture) were given on two occasions allows for some hypothesis testing. First, the stability of the MSR should be higher than the stability of the MSR-L because the MSR was given in the same course and the MSR-L was given following different feedback conditions. A second hypothesis is that the correlation between the MSR and MSR-L should not be too high. A high correlation would suggest that the MSR and MSR-L are not sufficiently different as to warrant the use of a new questionnaire. Only cases without any missing data were used to test our two hypotheses**.**Results are shown in Table 4. Hypothesis #1 was supported. The MSR was very stable (r = .687). Hypothesis #2 also was supported. On occasion one, the correlation between the MSR and MSR-L was .025. On occasion #2, the correlation between the MSR and MSR-L was .128. As hypothesized, the two questionnaires are measuring two distinct constructs.

Construct Validity

Construct validity is the most important characteristic of any measurement. Does an instrument measure what it is supposed to measure? Are hypotheses about scores on the instrument supported in the research literature. Construct validity subsumes reliability, item analysis, and all other types of validity (Messick, 1989). Multiple studies are needed before construct validity can be adequately assessed. All the findings presented above attest to the construct validity of the MSR-L. Furthermore, the studies by the first author

(Brady & Forest, 2018; Brady et al, 2013, 2020) on feedback and metacognitive self-regulation attest to the construct validity of the instrument. The program of research by Brady and her colleagues is only just the beginning. Much more research is needed to fully establish the construct validity of the MSR-L and facsimiles of the MSR-L that are used for tasks other than listening to lectures.

Utility

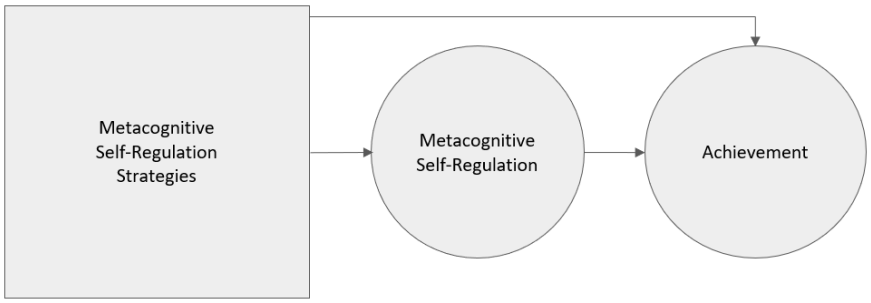
The predominant model of research on metacognitive self-regulation is shown in Figure 2. Much research on metacognition is experimental or quasi-experimental and is represented by the top arrow in Figure 2. Researchers manipulate an aspect of instruction that in theory relates to increased metacognitive self-regulation (e.g., planning, feedback, etc.) to examine the effect of the manipulation on achievement(Lavery, 2008 cited by Hattie, 2009, de Boer et al., 2018). There is another body of correlational research that relates a measurement of metacognitive self-regulation (e.g., Pintrich's MSR measure, 1991) to achievement. The body of literature is depicted by the arrow going from metacognitive self-regulation to achievement. To date, there is strong support for two conclusions: 1) Manipulated metacognitive strategy training exerts a positive effect on achievement, and 2) Self-report measurements of metacognitive self-regulation are positively correlated with achievement.

What is missing in the literature are tests of the causal model depicted in Figure 2 in a single study. This is very important because metacognitive self-regulation is hypothesized to mediate the relationship between metacognitive self-regulation strategy training and achievement (see meta-analysis by de Boer et al., 2018). To illustrate, the fact that researchers have found a positive relationship between feedback training and achievement may or may not support the theory that metacognitive self-regulation mediates the relationship. After all, there are numerous studies that identify feedback as one of the most powerful influences on achievement (see meta-analysis by Hattie, 2009). Our proposed new instrument is presented in this article with this gap in the literature in mind. It is theoretically and practically important to separate the effects of metacognitive strategy training into effects that are and are not related to meta-cognitive self-regulation. This can be accomplished by a multivariate analysis, ideally structural equation modeling.

We view the MSR-L as a scaffold for the development of new instruments that can be tailored to a researcher's needs. For example, a researcher that hypothesizes that metacognitive self-regulation strategy training for homework assignments influences metacognitive self-regulation which in turn influences achievement (see Figure 2) could revise the MSR-L by using "Yesterday's homework assignment" as the lead-in to each item, and by substituting "future assignments" for "lecture". Multiple course activities also could also be used in a longer questionnaire if justified by theory. The application of the MSR-L scaffold to research on metacognitive self-regulation could be applied to numerous metacognitive strategy manipulations and to many instructional activities (e.g., readings, assignments, lectures, labs, testing, etc.).

Figure 2

Causal Diagram for Metacognitive Self-Regulation



Limitations

The chief limitation of the MSR-L is that it is a self-report instrument that is subject to bias. For example, responses can be influenced by demand characteristics of the study and the respondent's feelings about a particular metacognitive self-regulation strategy. To illustrate, a highly animated strategy manipulation might be something respondents like due to a novelty effect, and this sentiment might result in their answering favorably to a questionnaire about metacognitive self-regulation when in fact there was no effect. It is probably impossible to eliminate construct irrelevant variance in self-report measures, but there are alternatives to self-report questionnaires that are less subject to bias (think-aloud protocols, interviews, physical responses, and observations). Further research on these alternatives is warranted.

Another limitation of the MSR-L is that it is a unidimensional instrument, while the theory behind it suggests it should be multi-dimensional. Pintrich (Pintrich et al, 1991) maintains that self-regulation has three components: planning, monitoring, and regulating, but despite multiple factor analytic efforts by Pintrich and his colleagues there is no empirical evidence that these dimensions can be differentiated (Pintrich et al., 2000). The fact that there is a disjoint between theory and data is a significant limitation because theory guides the development of interventions that support metacognitive self-regulation.

Regarding metacognitive self-regulated learning, "the issue of domain specificity and transfer may be the largest and most intractable problem confronting our theoretical and assessment efforts" (Pintrich et al., 2000, p.88). Some authors assume that increased metacognitive self-regulation on one task (e.g., reading) will generalize to other tasks (writing), but there is little research to support this assumption. The same limitation can be applied to the MSR-L which is limited to a single task – listening to lectures. Our solution to this problem is to modify the MSR-L so that it applies to other tasks, but research is needed to access whether metacognitive self-regulation is generalizable across tasks. There is one illustrative study carried out by Pintrich and DeGroot (1990). The authors modified selected items from the MSLQ to create a new scale (Self-Regulation Strategy Use) by adding a lead in stem to each item (e.g., "When I am studying . . . "). This procedure is like our proposed modifications of the MSR-L to research tasks other than listening to lectures.

Summary and Implications to Practice

The *Metacognitive Self-Regulation in Lecture Scale* (Brady, 2022) provides a finer tuned lens with greater resolution specific to the lecture settings. Instructors in this context aim to identify needs in their students to guide the course of the learning experience feedback. As with the course-specific MSR, the MSR-L can provide a simple, reasonably quick, formative perspective closer to a real-time experience in lecture settings (Brady et al., 2013) so that instructors can better gauge and tailor learning, which is the *end-goal* of lectures. Further, the MSR-L can be adapted to alternative metacognitive self-regulation strategies in other domains (e.g., reading, writing) and other aspects of the college classroom (e.g., testing, homework).

References

Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., Raths, J. & Wittrock, M. C. (2001).*A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives,* White Plains, NY: Longman.

Bloom, B. S. (Ed.), Englehart, M. D., Furst, E. J., Hill W. H., Krathwohl, D. R. (1956). The Taxonomy of Educational Objectives. The Classification of Educational Goals, Handbook I: Cognitive Domain, New York: David McKay Company.

Brady, M. (2022) *Metacognitive Self-Regulation in Lecture Scale* . Unpublished.

Brady, M. & Forest, C. (2018). Metacognition, formative assessment, and student perspective: learning about metacognition through in-class comparisons of response systems. *Journal of Physician AssistantEducation* , 29(2), 104-108. https://doi.org/10.1097/jpa.0000000000000203

Brady, M. L., Seli, H., & Rosenthal, J. (2013). "Clickers" and metacognition: A quasi-

experimental comparative study about metacognitive self-regulation and use of electronic

feedback devices. *Computers & Education. 65*(2013), 56-63.

doi: http://dx.doi.org/10.1016/j.compedu.2013.02.001

Brady, M. L., Forest, C., Rosenthal, J., & Hocevar, D. (2020). Anonymous versus public

student feedback systems: Metacognition and achievement with graduate learners. *Educational*

Technology Research and Development, 1-20. https://doi.org/10.1007/s11423-020-09800-6

*de Boer, H., Donker, A. S., Kostons, D. D., & van der Werf, G. P. (2018). Long-term effects of metacognitive strategy instruction on student academic performance: A meta-analysis. *Educational Research Review . 24* 98-115. https://doi.org/10.1016/j.edurev.2018.03.002

Flavell, J. (1979). Metacognition and cognitive monitoring: A new era of cognitive

development inquiry. *American Psychologist, 34*, 906-911. https://doi.org/10.1037/0003-066X.34.10.906

*Hattie, J. (2009). *Visible Learning: A Synthesis of Over 800 Meta-analyses Relating to Achievement* . New York: Routledge. https://doi.org/10.4324/9780203887332

*Lavery, L. (2008). Self-regulated learning for academic success: An evaluation of instructional techniques. Unpublished Dissertation, University of Auckland, Australia. Cited in Hattie, J. (2009). *Visible Learning: A Synthesis of Over 800 Meta-analyses Relating to Achievement* . New York: Routledge. https://doi.org/10.4324/9780203887332

Messick, S. (1989). Validity. In R. L. Linn (Ed.). *Educational Measurement* (3rd Ed., pp. 13-104). New York: MacMillan.

Mokhtari, K., & Reichard, C. A. (2002). Assessing students' metacognitive awareness of reading strategies. *Journal of Educational Psychology* , *94* (2), 249-259. https://doi.org/10.1037//0022-0663.94.2.249

Pintrich, P. R., Smith, D. A. F., Garcia, T. & McKeachie, W. J. (1991).*A Manual for the Use of the Motivated Strategies for Learning Questionnaire* (MSLQ). Unpublished.

Pintrich, P. R., Smith, D. A. F., Garcia, T. & McKeachie, W. J. (1993). Reliability and predictive validity of the *Motivated Strategies for Learning Questionnaire . Educational and Psychological Measurement, 53,* 801-813. http://dx.doi.org/10.1177/0013164493053003024

Pintrich, P. R., Wolters, C. A., & Baxter, G. P. (2000). Assessing metacognition and self-regulated learning. In G. Schraw & J. C. Impara (Eds.), *Issues in the Measurement of Metacognition* (pp. 43–97). Lincoln, NE: Buros Institute of Mental Measurements. Retrieved from http://digitalcommons.unl.edu/burosmetacognition/3

Schunk, D. H. (2005). Self-regulated learning: The educational legacy of Paul R. Pintrich. *Educational Psychologist* , *40* (2), 85-94. https://doi.org/10.1207/s15326985ep4002_3

Appendix A

Metacognitive Self-Regulation in Lecture Scale (Brady, 2022)

Instruction . Please read the following questions and circle the answer that is most correct for you.

1 = Not at all true of me 7 = Very True of me

_____helps to clarify the purpose for me when taking notes in lecture	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2 _____helps me know if the reading I did to prepare for lecture was on track	**1**	**2**	**3**	**4**	**5**	**6**	**7**
_____helps me decide what to write in my lecture notes	**1**	**2**	**3**	**4**	**5**	**6**	**7**
_____helps me decide what to ignore in lecture	**1**	**2**	**3**	**4**	**5**	**6**	**7**
_____- helps me see how the lecture material fits with the text	**1**	**2**	**3**	**4**	**5**	**6**	**7**
_____- helps me to understand what I've written in my lecture notes	**1**	**2**	**3**	**4**	**5**	**6**	**7**
_____helps me to know what questions to ask in lecture when the topic is difficult	**1**	**2**	**3**	**4**	**5**	**6**	**7**

_____helps to clarify the purpose for me when taking notes in lecture	**1**	**2**	**3**	**4**	**5**	**6**	**7**
_____helps me to get my focus back on track in lecture	**1**	**2**	**3**	**4**	**5**	**6**	**7**
_____- helps me focus on questions to write down during lecture	**1**	**2**	**3**	**4**	**5**	**6**	**7**
_____- helps me decide on key concepts and key words to write in my lecture notes	**1**	**2**	**3**	**4**	**5**	**6**	**7**
_____- helps me to know when a lecture idea is important to highlight or underline	**1**	**2**	**3**	**4**	**5**	**6**	**7**
_____- helps me rethink how I write ideas in my own words in my lecture notes	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Conflict of Interest Statement

The authors declare no conflict of interest.