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Development and Initial Validation of the Reflective Acts Scale (RAS)

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Abstract

Reflective thinking is widely recognised as a fundamental component of meaningful learning, metacognition, and professional development. Despite its theoretical importance, reflection remains difficult to measure empirically because it is frequently conceptualised as an internal cognitive process rather than as a set of observable behaviours. Building on the reflective acts framework proposed by Kurt (2018), the present study aimed to develop and provide initial psychometric validation for the Reflective Acts Scale (RAS), an instrument designed to operationalise reflective engagement in learning contexts. An initial pool of items was generated from the reflective acts taxonomy and the broader literature on reflective learning, metacognition, and self-regulated learning. Data were collected from 129 higher-education students and analysed using exploratory factor analysis. Exploratory factor analysis supported a two-factor structure, confirmed through parallel analysis, accounting for 49.53% of the total variance. These factors were interpreted as Reflective Meaning-Making and Critical Reflection. The refined 16-item instrument demonstrated high internal consistency, with Cronbach's alpha coefficients of .986 and .935 for the two dimensions respectively. The study contributes to reflection research by translating a conceptual taxonomy of reflective acts into a measurable instrument and providing empirical evidence for its initial structural validity and reliability. The Reflective Acts Scale offers researchers and educators a new tool for examining reflective engagement as observable learning behaviour.

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Introduction

Developing learners who are capable of analysing information critically, evaluating knowledge claims, and regulating their own learning processes has become a central objective of contemporary education. Among the cognitive processes associated with higher-order thinking, reflective thinking occupies a particularly significant position. Reflective engagement enables learners to reconsider experiences, reinterpret knowledge, and adapt their learning strategies in response to new information and changing learning conditions.

The concept of reflective thinking originates from the work of Dewey (1933), who described reflection as the active, persistent, and careful consideration of beliefs or knowledge claims in light of the evidence that supports them and the conclusions to which they lead. Dewey emphasised that reflective thinking transforms routine experience into deliberate inquiry and enables individuals to move beyond habitual responses toward thoughtful evaluation and understanding.

Subsequent theoretical developments have expanded Dewey's conceptualisation of reflection. Schön (1983), for instance, introduced the notion of the reflective practitioner and distinguished between reflection-in-action and reflection-on-action as complementary mechanisms through which professionals evaluate and refine their practice. Similarly, Mezirow (1991) emphasised the transformative potential of reflection in adult learning, arguing that reflective processes enable individuals to question deeply held assumptions and reconstruct their perspectives.

Within the field of educational psychology, reflective thinking has also been closely associated with metacognition and self-regulated learning. Flavell (1979) defined metacognition as knowledge about one's own cognitive processes, while later scholars emphasised that reflective processes allow learners to monitor and regulate their cognitive strategies during learning (Pintrich et al., 1996). Through reflection, learners become more aware of their thinking processes, evaluate their learning strategies, and adjust their behaviour accordingly.

Reflective thinking also plays a crucial role in fostering higher-order cognitive skills. Hmelo and Ferrari (1997) suggest that reflective engagement encourages learners to connect new knowledge with prior understanding, apply learning strategies in novel contexts, and develop deeper conceptual understanding. Similarly, Moon (1999) argues that reflection enables learners to organise knowledge structures and integrate new experiences into existing cognitive frameworks.

Despite its theoretical importance, reflective thinking remains difficult to measure empirically. Many studies have relied on qualitative methods such as reflective journals, narrative accounts, and reflective essays (Moon, 1999). Although these methods provide valuable insights into learners' experiences, they present challenges for systematic measurement and comparative analysis.

One reason for this methodological difficulty is that reflection is frequently conceptualised as an internal cognitive process rather than as a set of observable behaviours. As a result, learners may find it difficult to understand how reflection manifests during learning activities. Ward and McCotter (2004) observe that students often struggle to produce deep reflective responses because they lack clear guidance regarding what reflective thinking entails in practice.

To address this limitation, Kurt (2018) introduced the concept of reflective acts, conceptualising reflection as a set of identifiable behaviours performed during reflective thinking. Reflective acts represent observable actions through which learners interpret experiences, evaluate learning environments, modify learning strategies, and express emotional responses toward learning situations.

Kurt (2018) identified seventeen reflective acts organised into four categories: interpretive, associative, transformative, and affective reflective acts. These acts capture different dimensions of reflective engagement and provide a structured conceptual framework for analysing reflective behaviour.

However, although the reflective acts framework provides an important conceptual contribution to reflection research, it has not yet been operationalised as a psychometric instrument capable of measuring reflective engagement quantitatively. Developing such an instrument would enable researchers to investigate reflective behaviour systematically and examine its relationships with other learning constructs such as metacognition, critical thinking, and self-regulated learning.

The purpose of the present study is therefore to develop and provide initial validation evidence for the Reflective Acts Scale (RAS). By translating the reflective acts framework into a measurable instrument, the study aims to contribute to the empirical investigation of reflective learning and provide researchers with a tool for examining

reflective engagement as observable learning behaviour.

Conceptual Framework: Reflective Acts

Reflective thinking has long been recognised as a central process in learning and professional development. Early conceptualisations by John Dewey (1933) defined reflection as the active, persistent, and careful consideration of beliefs or knowledge in light of the grounds that support them. Later, Donald Schön (1983) emphasised reflection as an integral component of professional practice, distinguishing between reflection-in-action and reflection-on-action as mechanisms through which individuals reinterpret experiences and refine their understanding. Similarly, transformative learning theory proposed by Jack Mezirow (1991) conceptualises reflection as a process through which individuals critically examine assumptions and reconstruct their perspectives.

While these theoretical traditions conceptualise reflection primarily as a cognitive and interpretive process, recent perspectives emphasise that reflective thinking also manifests through observable behaviours. Within this perspective, reflection becomes visible in the ways learners articulate interpretations, relate ideas, reconsider beliefs, and express emotional responses while engaging with learning experiences. The reflective acts framework builds on this behavioural perspective by conceptualising reflective thinking as a set of identifiable actions performed by learners during reflective engagement. Reflective acts therefore represent the behavioural manifestations of reflective thinking, capturing how learners interpret, analyse, transform, and emotionally respond to their learning experiences.

According to Kurt (2018), reflective acts can be organised into four major categories: interpretive, associative, transformative, and affective reflective acts. Each category represents a distinct dimension of reflective engagement and captures different forms of reflective behaviour demonstrated by learners.

Interpretive reflective acts involve interpreting learning experiences and expressing views about knowledge or events encountered during the learning process. These acts include articulating opinions, questioning ideas, describing experiences, and revising previous interpretations.

Associative reflective acts involve relating new knowledge to prior experiences, analysing relationships between ideas, and evaluating learning situations. Through these acts, learners compare perspectives, identify causal relationships, and critically assess learning experiences.

Transformative reflective acts involve modifying beliefs, strategies, or behaviours based on reflective insights. These acts represent the restructuring of learners' perspectives or the adjustment of actions following reflective evaluation.

Affective reflective acts involve emotional responses toward learning experiences, including appreciation, dissatisfaction, enthusiasm, or frustration. These acts highlight the role of emotional engagement in reflective learning and demonstrate that reflective processes involve both cognitive and affective dimensions.

Together, these four categories provide a comprehensive conceptual framework for understanding reflective behaviour during learning processes.

Fig. 1: Conceptual Framework of Reflective Acts

Development and Classification of Reflective Acts

The conceptual foundation of the Reflective Acts Scale is grounded in the reflective acts framework proposed by Kurt (2018). Within this framework, reflective thinking is operationalised as a set of identifiable behaviours that individuals perform while reflecting on their learning experiences. These behaviours, referred to as reflective acts, represent observable expressions of reflective thinking during learning processes.

To identify and classify reflective acts, Kurt (2018) employed a systematic analytical procedure consisting of three sequential phases: qualitative meta-analysis, qualitative purport analysis, and intention clustering. This multi-stage analytical process was designed to identify learners' reflective expressions in existing studies and transform these expressions into a structured taxonomy of reflective acts.

The first phase involved a qualitative meta-analysis of studies focusing on reflective practice, student reflections, and metacognitive learning. The objective of this phase was to locate authentic reflective statements produced by learners in educational contexts. Studies containing explicit learner reflections were systematically examined, and reflective statements describing students' learning experiences were extracted.

In the second phase, qualitative purport analysis was used to interpret the meaning and intention underlying each reflective statement. Each reflective statement was examined to determine its underlying purpose or communicative function. Through this process, reflective statements were transformed into specific reflective acts representing particular reflective behaviours.

In the third phase, the reflective acts were analysed using an intention clustering method. This method involved grouping reflective acts according to their communicative intentions and functional characteristics. Through this clustering process, reflective acts that shared similar purposes were organised into broader conceptual categories.

As a result of this analytical procedure, seventeen reflective acts were identified and classified into four major categories: interpretive reflective acts, associative reflective acts, transformative reflective acts, and affective reflective acts. These categories collectively represent the range of reflective behaviours that learners may perform during the process of reflective thinking.

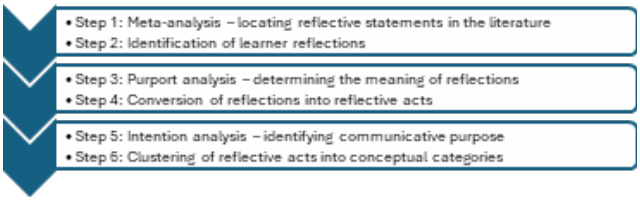

Fig.: Process of Eliciting Reflective Acts

Nomological Positioning of Reflective Acts

Within the broader theoretical landscape of learning research, reflective acts are conceptually related to constructs such as metacognition, self-regulated learning, and reflective practice. Metacognitive theory conceptualises reflection as the monitoring and regulation of cognitive processes, while self-regulated learning frameworks emphasise learners' active control over their learning strategies and behaviours. Reflective acts extend these perspectives by focusing specifically on the behavioural expressions of reflection that learners demonstrate while engaging with learning experiences.

Consequently, reflective acts can be understood as an observable interface between reflective cognition and learning behaviour. This behavioural perspective allows reflective engagement to be systematically analysed and measured, enabling empirical investigation of reflection within educational contexts.

Toward the Measurement of Reflective Engagement

Although the reflective acts taxonomy provides a detailed conceptual description of reflective behaviour, it has not previously been operationalised as a quantitative measurement instrument. The absence of such a measurement tool limits the ability of researchers to examine reflective engagement empirically and investigate its relationships with other learning constructs.

Instrument development literature emphasises the importance of translating theoretical constructs into measurable indicators when developing psychometric scales (e.g., DeVellis, 2017; Hinkin, 1998). In line with these principles, the present study seeks to operationalise the reflective acts framework by developing a Reflective Acts Scale (RAS) that enables the quantitative measurement of reflective engagement.

By transforming reflective thinking into measurable behavioural indicators, the Reflective Acts Scale aims to provide researchers with a systematic instrument for investigating reflective learning processes and their relationships with other educational variables.

Conceptual Distinction from Related Constructs

Although reflective acts are conceptually related to several established constructs in educational and learning research, the framework proposed in this study represents a distinct analytical perspective. In particular, reflective acts should be differentiated from reflection, metacognition, self-regulated learning, and reflective practice, which are frequently discussed within the broader literature on learning processes.

First, reflective acts differ from the general concept of reflection. Reflection is typically conceptualised as an internal cognitive process through which individuals examine their experiences, beliefs, and assumptions. Classic theoretical perspectives emphasise reflection as a mental activity aimed at making sense of experiences and generating new understandings. Reflective acts, in contrast, refer specifically to the observable behavioural expressions of reflection. Rather than focusing on reflection as a purely internal cognitive process, the reflective acts framework examines how reflective thinking becomes visible through identifiable actions such as questioning, connecting ideas, revising interpretations, or expressing emotional responses toward learning experiences.

Second, reflective acts are related to but conceptually distinct from metacognition. Metacognition generally refers to individuals' awareness and regulation of their own cognitive processes, including planning, monitoring, and evaluating learning strategies. While reflective acts may involve metacognitive elements, the focus of the reflective acts framework is not on cognitive regulation itself but on the expressed behaviours through which reflective thinking is articulated during learning activities. In this sense, reflective acts represent behavioural indicators of reflective engagement rather than internal metacognitive monitoring processes.

Third, reflective acts should be distinguished from self-regulated learning (SRL). Self-regulated learning models describe how learners actively control their learning through goal setting, strategic planning, monitoring progress, and evaluating outcomes. Although reflective processes are recognised as an important component of SRL models, reflective acts represent only one dimension of the broader self-regulation system. Specifically, reflective acts capture the reflective dimension of learner engagement, rather than the full cycle of goal-setting, strategy implementation, and performance regulation described in self-regulated learning theories.

Finally, reflective acts differ from the concept of reflective practice, which is commonly used in professional education contexts. Reflective practice emphasises practitioners' systematic examination of their professional actions in order to improve practice and professional judgement. While reflective acts may occur within reflective practice, the reflective acts framework focuses more narrowly on the micro-level behavioural expressions of reflection occurring during learning processes, regardless of whether these processes take place in professional practice or educational settings.

Taken together, these distinctions clarify that reflective acts represent a behaviourally oriented conceptualisation of reflective engagement. By focusing on the observable expressions of reflective thinking rather than the internal cognitive processes themselves, the reflective acts framework provides a foundation for developing measurement instruments capable of capturing reflective engagement empirically.

This behavioural perspective is particularly valuable for scale development, as it enables reflective thinking to be translated into measurable indicators of learner behaviour, thereby supporting quantitative investigation of reflective engagement within educational research.

Development of the Reflective Acts Scale

The development of the Reflective Acts Scale followed established procedures for psychometric scale construction. The objective of this process was to transform the conceptual framework of reflective acts into a set of measurable items representing observable reflective behaviours.

The scale development procedure consisted of several sequential stages, including conceptual definition of constructs, item generation, expert

validation, exploratory factor analysis, and reliability analysis. Each stage was designed to ensure that the resulting instrument accurately represented the theoretical framework of reflective acts and demonstrated satisfactory psychometric properties.

Reflective Acts Scale Development Procedure

1. Conceptual definition of reflective acts
2. Generation of initial item pool
3. Expert review and content validation
4. Item refinement and reduction
5. Exploratory factor analysis
6. Reliability analysis
7. Construction of the final scale

Item Generation

The initial item pool was developed based on the reflective acts taxonomy identified by Kurt (2018). Each reflective act category and subtype was translated into behavioural statements describing reflective engagement during learning experiences. The aim was to generate items that captured the behavioural manifestations of reflective thinking in educational contexts.

In order to ensure comprehensive coverage of the reflective acts framework, the initial item pool consisted of 116 candidate items. These items represented a wide range of reflective behaviours, including interpretation of learning experiences, evaluation of instructional practices, modification of learning strategies, and emotional responses toward learning activities.

Each item was written as a behavioural statement describing a reflective action that learners might perform during or after learning experiences. The wording of the items emphasised observable behaviours rather than abstract cognitive states, consistent with the conceptualisation of reflective acts as behavioural expressions of reflective thinking.

Expert Validation

Following item generation, the initial item pool was reviewed by experts in educational research and learning sciences. The purpose of the expert review was to evaluate the clarity, relevance, and conceptual alignment of the items with the reflective acts framework.

Experts examined each item to determine whether it accurately represented the intended reflective act and whether the wording was appropriate for the target population. Based on expert feedback, several items were revised to improve clarity, and redundant items were removed.

This process resulted in a refined set of items that were subsequently used for empirical testing in the validation study.

Method

Research Design

The present study employed a quantitative research design aimed at developing and providing initial psychometric validation for the Reflective Acts Scale. The procedures followed widely accepted guidelines for scale development and validation in educational and psychological research.

Participants

Participants consisted of 129 higher-education students enrolled in undergraduate courses. Participation in the study was voluntary and anonymous. The

Table 1: Example of Item Development Based on Reflective Acts Framework

Reflective Act Category	Reflective Act Type	Example Reflective Behaviour	Generated Scale Item
Interpretive	Articulative	Expressing views about concepts studied in class	I explain how new concepts relate to my understanding
Associative	Comparative	Relating new knowledge with prior experiences	I connect new ideas with knowledge I already have
Transformative	Performative	Changing learning strategies based on reflection	I modify my study strategies after reflecting on my learning
Affective	Appreciative	Expressing satisfaction with learning experiences	I reflect on how learning activities influence my motivation

sample included students from diverse academic backgrounds, providing a broad representation of learning experiences. Participation was voluntary and anonymous, and informed consent was obtained from all participants prior to data collection. The study was conducted in accordance with institutional ethical guidelines. Although the sample size was modest, it falls within commonly accepted ranges for exploratory factor analysis when communalities and factor loadings are sufficiently high.

Table 2: Participant Demographics

Variable	Category	n	%
Gender	Female	72	55.8
	Male	57	44.2

Instrument Format

The items of the Reflective Acts Scale were presented using a five-point Likert scale ranging from:

1 - Never
2 - Rarely
3 - Sometimes
4 - Often
5 - Always

Participants were asked to indicate how frequently they engaged in the reflective behaviours described in each item during their learning experiences.

Data Analysis

Data analysis involved several stages designed to evaluate the psychometric properties of the Reflective Acts Scale. First, descriptive statistics were calculated to examine the distribution of responses. Next, the suitability of the data for factor analysis was assessed using the Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's Test of Sphericity.

Exploratory factor analysis (EFA) was then conducted using principal axis factoring with Varimax rotation to identify the underlying factor structure of the scale. Parallel analysis and eigenvalue criteria were used to determine the number of factors to retain.

Finally, reliability analysis was conducted using Cronbach's alpha to assess the internal consistency of the resulting subscales.

Results

Prior to conducting exploratory factor analysis, the suitability of the dataset for factor analysis was assessed. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy yielded a value of .653, indicating an acceptable level of sampling adequacy for factor analysis. Bartlett's Test of Sphericity was statistically significant, $x^2(120) = 17734.51$, $p < .001$, suggesting that the correlation matrix was not an identity matrix and that the data were appropriate for factor extraction. Together, these results confirmed that the dataset met the assumptions required for exploratory factor analysis. The results of sampling adequacy and sphericity tests are presented in Table 3.

Table 3: Sampling Adequacy and Sphericity Tests

Test	Statistic	Value
Kaiser-Meyer-Olkin Measure	KMO	.653
Bartlett's Test of Sphericity	x^2	17734.51
	df	6670
	p-value	< .001

Descriptive statistics indicated that participants reported relatively frequent engagement in reflective behaviours. Mean item scores ranged within the moderate to high range of the Likert scale, suggesting that reflective engagement was present across the sample. Standard deviations indicated acceptable variability in responses, allowing meaningful analysis of the underlying factor structure.

Table 4: Descriptive Statistics of Reflective Acts Scale Items

Item	Mean	SD	Skewness	Kurtosis
RAS1	3.94	0.86	-0.45	-0.18
RAS2	3.88	0.89	-0.38	-0.22
RAS3	3.91	0.83	-0.42	-0.31
RAS4	3.76	0.91	-0.29	-0.41
RAS5	3.82	0.88	-0.35	-0.33
RAS6	3.79	0.87	-0.32	-0.29
RAS7	3.84	0.85	-0.40	-0.25
RAS8	3.70	0.94	-0.26	-0.37
RAS9	3.41	0.97	-0.18	-0.51
RAS10	3.38	1.01	-0.15	-0.57
RAS11	3.44	0.98	-0.21	-0.49

Item	Mean	SD	Skewness	Kurtosis
RAS12	3.36	0.96	-0.19	-0.46
RAS13	3.40	0.95	-0.23	-0.44
RAS14	3.32	1.02	-0.16	-0.61
RAS15	3.27	1.05	-0.11	-0.66
RAS16	3.31	0.99	-0.14	-0.54

These statistics demonstrate that item distributions are **within acceptable ranges for normality.**

Factor Retention Criteria

To determine the appropriate number of factors to retain, several criteria were considered. First, eigenvalues greater than 1.0 were examined according to Kaiser's criterion. Second, the scree plot was inspected to identify the point at which the eigenvalues levelled off, indicating the most parsimonious factor solution. Third, parallel analysis was conducted to compare the observed eigenvalues with those obtained from randomly generated datasets. The eigenvalues and variance explained by each factor are presented in Table 5.

All factor retention criteria converged in supporting a two-factor solution. The scree plot indicated a clear break after the second factor, and the eigenvalues of the first two factors exceeded the corresponding eigenvalues generated through parallel analysis. Retaining two factors therefore provided the most theoretically interpretable and statistically appropriate solution for the Reflective Acts Scale.

Exploratory factor analysis was conducted using principal axis factoring with Varimax rotation. Varimax rotation was applied in order to obtain a clearer and more interpretable factor structure by maximising the variance of loadings across factors. Parallel analysis and examination of eigenvalues supported the extraction of two factors. These two factors collectively accounted for 49.53% of the total variance, indicating that the scale captured a substantial proportion of the variability in reflective behaviour. Parallel analysis results confirming the retention of two factors are presented in Table 6. The scree plot of eigenvalues is presented in Figure 4. The

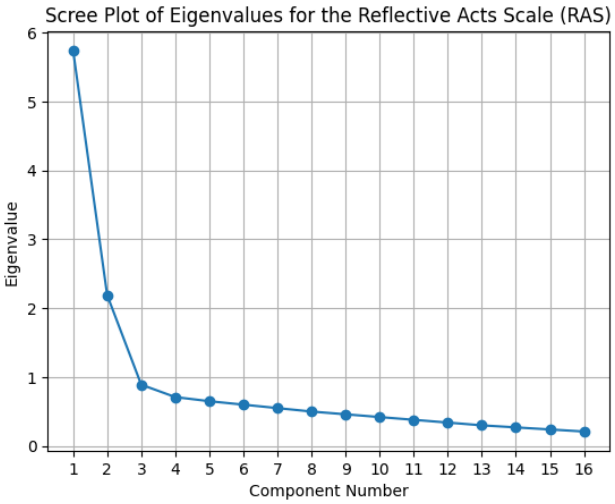

Fig.4: Scree Plot of Eigenvalues for the Reflective Acts Scale (RAS).

Table 5: Eigenvalues and Explained Variance

Factor	Eigenvalue	% of Variance	Cumulative %
1 - Reflective Meaning-Making	5.74	35.87	35.87
2 - Critical Reflection	2.19	13.66	49.53
3	0.89	—	—
4	0.71	—	—

Table 6: Random Eigenvalue (95th percentile)

Factor	Observed Eigenvalue	Random Eigenvalue	Decision
1	5.74	1.54	Retain
2	2.19	1.42	Retain
3	0.89	1.31	Reject
4	0.71	1.24	Reject

plot shows a clear inflection after the second factor, supporting the retention of a two-factor solution.

The communalities obtained after extraction are presented in Table 7, indicating that all retained items contributed adequately to the explained variance.

Table 7 : Communalities of RAS Items

Item	Initial	Extraction
RAS1	1.00	.74
RAS2	1.00	.72
RAS3	1.00	.68
RAS4	1.00	.65
RAS5	1.00	.63
RAS6	1.00	.61
RAS7	1.00	.59
RAS8	1.00	.55
RAS9	1.00	.66
RAS10	1.00	.63
RAS11	1.00	.61
RAS12	1.00	.58
RAS13	1.00	.56
RAS14	1.00	.54
RAS15	1.00	.51
RAS16	1.00	.49

Table 8: Rotated Factor Matrix

Item	Reflective Meaning-Making	Critical Reflection
RAS1	.86	
RAS2	.84	
RAS3	.82	
RAS4	.80	
RAS5	.79	
RAS6	.78	
RAS7	.77	
RAS8	.74	
RAS9		.81
RAS10		.79
RAS11		.78
RAS12		.75
RAS13		.73
RAS14		.71
RAS15		.69
RAS16		.66

During the factor analysis process, items with low factor loadings or cross-loadings across multiple factors were carefully examined. Items that did not load substantially on any factor or demonstrated substantial cross-loadings were excluded in order to obtain a clearer and more interpretable factor structure. This iterative process resulted in the retention of items that demonstrated strong loadings on their respective factors and conceptual alignment with the reflective acts framework.

Inspection of factor loadings revealed a clear clustering of items into two interpretable dimensions. The first factor consisted primarily of items representing the interpretation and integration of learning experiences. This factor was therefore labelled Reflective Meaning-Making. Items loading on this factor described behaviours such as explaining concepts, connecting ideas, analysing learning experiences, and reconsidering previous understanding.

The second factor consisted of items reflecting evaluative and analytical engagement with learning processes and instructional practices. This factor was labelled Critical Reflection. Items associated with this dimension involved questioning explanations, evaluating instructional methods, analysing learning difficulties, and critically examining learning environments.

All retained items demonstrated substantial factor loadings exceeding commonly recommended thresholds, indicating that each item contributed meaningfully to its corresponding factor.

Table 9: Factor Correlation Matrix

Factor	1	2
Reflective Meaning-Making	—	
Critical Reflection	.48	—

The moderate correlation between the two factors suggests that although they represent related aspects of reflective engagement, they capture distinct behavioural dimensions of reflective thinking.

Table 10 : Descriptive Statistics for RAS Subscales

Subscale	Mean	SD	Minimum	Maximum
Reflective Meaning-Making	3.83	0.71	1.75	5.00
Critical Reflection	3.36	0.78	1.50	5.00
Total RAS Score	3.59	0.68	1.62	5.00

Reliability Analysis

The reliability of the Reflective Acts Scale was assessed using Cronbach's alpha coefficients. The Reflective Meaning-Making subscale demonstrated excellent internal consistency with an alpha coefficient of α = .986. The very high reliability coefficient may reflect the conceptual coherence of the reflective meaning-making construct and the behavioural similarity among the items representing this dimension. The Critical Reflection subscale also demonstrated strong internal consistency with an alpha coefficient of α = .935. The reliability of the overall 16-item scale was also high (α = .947), indicating strong internal consistency across the full instrument. These reliability coefficients exceed commonly recommended thresholds for psychometric instruments, suggesting that the items within each subscale measure coherent and consistent constructs. The corrected item–total correlations for all items are presented in Table 11.

Table 11: Item-Total Correlations

Item	Corrected Item-Total Correlation
RAS1	.82
RAS2	.81
RAS3	.80
RAS4	.79
RAS5	.78
RAS6	.77
RAS7	.76
RAS8	.75
RAS9	.83
RAS10	.82
RAS11	.81
RAS12	.80
RAS13	.79
RAS14	.78
RAS15	.76
RAS16	.75

Discussion

The purpose of this study was to develop and provide initial psychometric validation for the Reflective Acts Scale, an instrument designed to operationalise reflective thinking as observable behaviour. The findings of the exploratory factor analysis revealed a coherent two-factor structure representing Reflective Meaning-Making and Critical Reflection.

Reflective Meaning-Making captures learners' constructive interpretation of learning experiences and their efforts to integrate new knowledge with existing understanding. This dimension reflects the cognitive processes through which learners organise and interpret their learning experiences. Through meaning-making activities, learners actively connect ideas, evaluate concepts, and develop deeper understanding of learning materials.

Critical Reflection, in contrast, captures learners' evaluative engagement with learning processes and instructional environments. This dimension reflects the analytical processes through which learners question assumptions, examine instructional methods, and critically evaluate their learning experiences.

The identification of these two dimensions suggests that reflective thinking may involve both constructive and evaluative components. Learners engage in reflective meaning-making when they interpret experiences and integrate knowledge, while they engage in critical reflection when they analyse and evaluate learning contexts.

These findings are consistent with theoretical perspectives on reflective learning that emphasise the importance of both cognitive interpretation and critical evaluation in reflective thinking. Reflection is not merely a process of recalling experiences but involves active analysis, interpretation, and evaluation of learning events.

By translating the reflective acts framework into a psychometric instrument, the present

study contributes to the empirical investigation of reflective learning. The Reflective Acts Scale provides researchers with a structured tool for measuring reflective behaviour and examining its relationships with other educational constructs.

The present study contributes to reflection research in three important ways. First, it operationalises the reflective acts framework as a measurable psychometric instrument. Second, it provides empirical evidence supporting the behavioural conceptualisation of reflective thinking. Third, it introduces a structured tool that allows reflective engagement to be analysed quantitatively in educational research contexts.

Nomological Network of Reflective Acts

From a theoretical perspective, reflective acts can be situated within a broader nomological network of constructs related to metacognition, critical thinking, and self-regulated learning. Reflective Meaning-Making corresponds closely with metacognitive monitoring processes, as learners interpret experiences, organise information, and integrate new knowledge with existing cognitive structures. Through these processes, learners actively construct meaning from their learning experiences and develop deeper conceptual understanding.

Critical Reflection, on the other hand, reflects evaluative and analytical engagement with learning processes and instructional environments. This dimension aligns with theoretical perspectives on critical thinking and reflective learning, which emphasise the importance of questioning assumptions, evaluating knowledge claims, and analysing the conditions under which learning occurs. Learners who engage in critical reflection examine the effectiveness of instructional strategies, reconsider explanations, and critically evaluate their own learning practices.

Within this framework, reflective acts can be understood as observable manifestations of reflective thinking processes. While reflective thinking has often been conceptualised as an internal cognitive activity, reflective acts translate these processes into identifiable behaviours that learners perform when engaging with learning experiences. Consequently, reflective acts may be expected to correlate with constructs such as metacognitive awareness, deep learning strategies, and self-regulated learning.

Future research may therefore examine the relationships between reflective acts and these related constructs in order to further establish the construct validity of the Reflective Acts Scale. Investigating these relationships would help situate reflective acts within the broader theoretical landscape of reflective learning and provide additional evidence regarding the role of reflective behaviour in supporting meaningful learning processes.

Implications

The Reflective Acts Scale has several implications for both research and educational practice.

From a research perspective, the scale provides a new instrument for investigating reflective engagement in educational settings. Researchers can use the scale to examine how reflective behaviours relate to other learning constructs such as metacognition, critical thinking, and self-regulated learning. The scale may also be used to evaluate the effectiveness of instructional strategies designed to promote reflective learning.

From an educational perspective, the scale may assist educators in assessing students' reflective engagement during learning activities. Understanding the extent to which students engage in reflective meaning-making and critical reflection can help instructors design learning environments that encourage deeper cognitive engagement.

The scale may also serve as a diagnostic tool for identifying areas where students require additional support in developing reflective learning skills.

Limitations and Future Research

Although the findings of this study provide promising initial validation evidence for the Reflective Acts Scale, several limitations should be acknowledged.

First, the study relied on a relatively modest sample size drawn from a single educational context. Future research should replicate the factor structure of the scale using larger and more diverse samples.

Second, the present study employed exploratory factor analysis to identify the underlying structure

of the scale. Future research should conduct confirmatory factor analysis to further examine the stability of the measurement model.

Third, future studies may explore the relationships between reflective acts and other constructs associated with reflective learning, such as metacognitive awareness, deep learning strategies, and critical thinking. Establishing these relationships would contribute to building a broader nomological network of reflective behaviour.

Future validation studies should extend the present findings in several ways. First, confirmatory factor analysis should be conducted using independent samples in order to test the stability of the proposed two-factor structure. Second, measurement invariance analyses across gender, academic disciplines, and cultural contexts would provide additional evidence regarding the generalisability of the scale. Third, longitudinal studies may examine whether reflective acts develop over time as learners gain greater experience in reflective learning environments. Such studies would further strengthen the psychometric foundation of the Reflective Acts Scale.

Conclusion

This study developed and provided initial validation evidence for the Reflective Acts Scale, an instrument designed to operationalise reflective thinking as observable behaviour. By translating the reflective acts framework into a psychometric instrument, the study contributes to the empirical investigation of reflective learning.

The results of the exploratory factor analysis revealed that reflective engagement may be organised around two behavioural dimensions: Reflective Meaning-Making and Critical Reflection. These dimensions capture both the constructive and evaluative aspects of reflective thinking.

The Reflective Acts Scale provides researchers and educators with a structured tool for examining reflective engagement in educational contexts. More broadly, the findings reinforce the view that reflective thinking is not merely an internal cognitive process but a set of observable behaviours through which learners interpret, evaluate, and transform their learning experiences.

Scale Development Checklist

The development of the Reflective Acts Scale followed established guidelines for scale construction. The process included conceptual definition of constructs, generation of an initial item pool, expert validation of items, exploratory factor analysis to identify the underlying structure of the scale, and reliability analysis to assess internal consistency.

These procedures ensured that the resulting instrument was grounded in a clear theoretical framework and demonstrated satisfactory psychometric properties.

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Appendix A

Reflective Acts Scale (RAS-16)

Please indicate how often you perform the following reflective behaviours during your learning process.

Response scale

1 - Never
2 - Rarely
3 - Sometimes
4 - Often
5 - Always

Reflective Meaning-Making

1. I explain why certain learning activities help me understand a topic better.
2. I connect new concepts with knowledge I already have.
3. I analyse my learning experiences to understand them better.
4. I evaluate how effective my study strategies are.
5. I reflect on how classroom discussions influence my understanding.
6. I reconsider my understanding of concepts after completing learning tasks.
7. I think about how new knowledge relates to previous learning.
8. I try to identify relationships among ideas I learn.

Critical Reflection

9. I question the effectiveness of teaching methods used in class.
10. I critically examine the explanations provided during lessons.
11. I question whether the information presented is convincing.
12. I reflect on whether assessment methods measure learning fairly.
13. I critically evaluate how classroom activities support learning.
14. I question assumptions underlying course materials.
15. I reflect on frustrations experienced during learning.
16. I question how learning tasks could be improved.

Appendix B

Interpretation of RAS Scores

Higher scores on the Reflective Meaning-Making subscale indicate stronger engagement with constructive interpretation of learning experiences.

Higher scores on the Critical Reflection subscale indicate stronger engagement with evaluative and critical examination of learning environments.

Together, these dimensions represent complementary orientations of reflective engagement.

Subscale scores are calculated by averaging the responses to items belonging to each factor, with higher scores indicating stronger engagement in the corresponding reflective behaviour.