

Shafaque Fatima¹¹Jinnah Sindh Medical University, Karachi. Email: Shafaque.fatima@jsmu.edu.pk

KEYWORDS	ABSTRACT
Cognitive engagement, feedback, students' conceptions, higher education, PLS-SEM.	<p>This study aimed to investigate the effect of students' conceptions of feedback on their cognitive engagement. Although student cognitive engagement is an extensively researched construct, it is still developing, and various areas remain to be explored one of which is the assessment context for student engagement. Educational researchers have highlighted that investigating the relationship between assessment and student engagement is crucial. To collect data for the constructs, a survey methodology was employed using a convenience sample of 499 university students from six public and private institutions. Two validated instruments the Students' Conceptions of Feedback (SCoF) inventory and Cognitive Engagement sub-scales from Attitudes Towards Mathematics (ATM) were administered after obtaining formal permission from the developers. Hypotheses were derived from an extensive literature review. Structural Equation Modeling (SEM) via SmartPLS 3 was utilized for statistical analysis. The findings revealed a statistically significant positive effect of SCoF on cognitive engagement.</p> <p> 2026 Journal of Social Sciences Development</p>
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Corresponding Author	Shafaque Fatima
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Introduction

In higher education, students' beliefs about instructional procedures are a critical factor that shapes students' overall educational experiences and understanding, as evidenced by empirical studies. In tertiary learning settings, students' perceptions of the learning environment have a greater impact on their learning conceptions than by the objective instructional practices (Entwistle, 1991). Therefore, the perceptions of students with regard to assessment are crucial as the design of assessment has a significant effect on the quality of learning outcomes (Entwistle, 1991; Marton & Säljö, 1997; Ramsden, 1997).

Students assess the instructor's expectations for the current task as well as for future revisions when feedback is provided, either in writing or orally. Students adjust their learning strategies when the feedback requires a thorough and detailed knowledge of the content. On the other hand, when feedback is mainly about the surface level of execution, for example, by rote learning or simply copying and pasting previous work, students do not invest further mental resources (Carless, 2015).

Student engagement relates to the level of involvement a student exhibits in learning activities. In particular, cognitive engagement is the degree to which a student is intellectualized and mentally engage in learning. There are two aspects to cognitive engagement: firstly, cognitive engagement directly affects students' academic behaviors, and secondly, it affects students' overall academic performance. Contemporary research highlights three aspects of cognitive engagement: mental effort, planfulness, and the desire to put forth the effort to understand difficult concepts and learn complex skills (Fredricks, Blumenfeld, & Paris, 2004).

One standard approach of conceptualizing cognitive engagement is in terms of depth of information processing (Craik & Lockhart, 1972; Graham & Golan, 1991), which are distinguished as shallow and deep processing (Greene & Miller, 1996). Academic tasks with high levels of deep processing are associated with high levels of metacognitive strategies, which enables deep strategic information processing. In contrast, shallow processing is a lower-level cognitive involvement that focuses on reproducing instructional content. Shallow processing involves using strategies that are intended to take in information without processing it for conceptual understanding, rather than metacognitive strategies that are intended to develop conceptual understanding. These include repetitive rehearsal, rote memorization, mnemonic devices, highlighting the text, and mechanical review of notes (Meece, Blumenfeld, & Hoyle, 1988; Miller & Nolen, 1988; Zimmerman & Pons, 1986).

Moreover, self-regulation has become an important construct in contemporary higher education research. Students' self-conceptions, strategy selection, and self-evaluation mechanisms are all factors that contribute (Cassidy, 2011). Despite the recognized importance of self-regulation for effective assessment (Panadero et al., 2014).

In Pakistan, university enrollment expanded rapidly after 2001. Between 2010 and 2015, the nation's higher education sector witnessed a 78% increase in degree-awarding institutions, causing student enrollment to rise dramatically by 174% (HEC, 2016). However, overall university participation remains low compared to regional South Asian peers (HEC, 2016). Furthermore, graduation rates remain unsatisfactory, with persistent dropout rates across various disciplines (Muslim, Raza, & Touseef, 2017; Sultana, 2017; Zaheer, Gul, Wazir, & Wazir, 2016). Due to a lack of long-term strategic alignment, this growth in human capital has not yet fully translated into proportional national economic development (Asghar & Zahra, 2012).

Statement of the Problem

Despite rapid structural expansion and a 174% surge in university enrollments across Pakistan (HEC, 2016), tertiary institutions suffer from high drop-out rates, delayed completion, and sub-

optimal academic performance (Zaheer et al., 2016; Sultana, 2017). A major underlying cause is low cognitive engagement among higher education students, who frequently rely on shallow processing strategies such as rote memorization and passive repetition rather than deep analytical processing, critical thinking, and metacognitive self-regulation (Carless, 2015; Panadero, 2017).

While formative assessment and feedback are theoretically recognized as fundamental catalysts for deep learning and self-regulation (Butler & Winne, 1995; Carless & Winstone, 2023), feedback literature has predominantly focused on instructor delivery mechanics, feedback design, or institutional evaluation policies, rather than exploring how students psychologically conceive, internalize, and operationalize feedback messages (Brown et al., 2016; Winstone et al., 2017). A profound disconnect persists: university instructors invest extensive time into providing feedback, yet students frequently ignore, misinterpret, or fail to act upon comments due to negative or passive feedback conceptions (Boud & Molloy, 2013).

Although research in Western contexts has begun investigating Students' Conceptions of Feedback (SCoF) (e.g., Peterson & Irving, 2008; Brown et al., 2016), there is a critical empirical gap regarding how SCoF influences specific dimensions of cognitive engagement within developing South Asian higher education systems like Pakistan. Without understanding students' feedback conceptions, universities risk delivering assessment practices that fail to students' foster cognitive engagement.

Research Questions and Objectives

Research Questions

1. What is the predictive effect of Students' Conceptions of Feedback (SCoF) on Cognitive Engagement (CE) among university students in Pakistan?
2. How do specific sub-dimensions of Students' Conceptions of Feedback (active use, enjoyment, peer help, tutor comments, and meeting expectations) influence components of cognitive engagement (self-regulation, deep strategy use, shallow strategy use, and persistence)?

Research Objectives

1. To empirically evaluate the direct predictive relationship between Students' Conceptions of Feedback (SCoF) and Cognitive Engagement (CE) using Structural Equation Modeling (PLS-SEM).
2. To examine the structural paths through which individual dimensions of feedback conceptions contribute to students' self-regulated learning, deep processing strategies, shallow strategy usage, and academic persistence.

Literature Review

Miller et al. Framework of Cognitive Engagement

The cognitive engagement framework established by Miller et al. comprises four interconnected dimensions:

a. Self-Regulated Learning (SRL): Self-regulated learning is a concept that involves cognitive, metacognitive, behavioral, motivational, and affective aspects of learning. It is an overall framework that encompasses important variables affecting academic success (such as self-efficacy and learning strategies) as a whole. Self-regulated learning thus has emerged as a key topic in educational psychology (Panadero, 2017).

b. Deep and Shallow Strategy Use: Cognitive engagement is usually considered in terms of depth of processing (Craik & Lockhart, 1972; Graham & Golan, 1991; Ravindran, Greene, & DeBacker, 2005). Deep processing: intentional attempts by the learner to create complex schema and conceptual understandings. Shallow strategy use, on the other hand, is a less complex cognitive process that is focused on reproducing material as it is presented, not elaborating on it (Greene & Miller, 1996).

c. Persistence: Persistence is a student's determination and perseverance in the face of academic difficulties. The persistence has a significant role in the completion of tasks and in the overall learning success (Sakurai, Pyhältö, Lindblom-Ylänne, 2012). It continues to be an important factor for higher education researchers around the world who are interested in increasing completion rates.

Conceptions of Feedback

Peterson and Irving (2008) highlighted that earlier feedback literature was heavily skewed toward institutional formative assessment goals while omitting student beliefs and perceptions. Subsequent studies (e.g., Harris, Brown, & Harnett, 2014; Brown et al., 2016) established that students' feedback conceptions heavily mediate learning outcomes. The SCoF model popularized by Brown et al. includes six intercorrelated factors: active use of feedback, enjoyment, peer help, ignoring feedback, meeting expectations, and tutor comments.

Methodology

Sample

This study utilized convenience sampling strategy to collect data from 499 undergraduate and graduate students across six universities (four public and two private) in Karachi, Pakistan. Convenience sampling is a widely acknowledged non-probability sampling technique suitable for educational and social science research (McCready, 2006; Oleson & Arkin, 2006).

Measurement Instruments

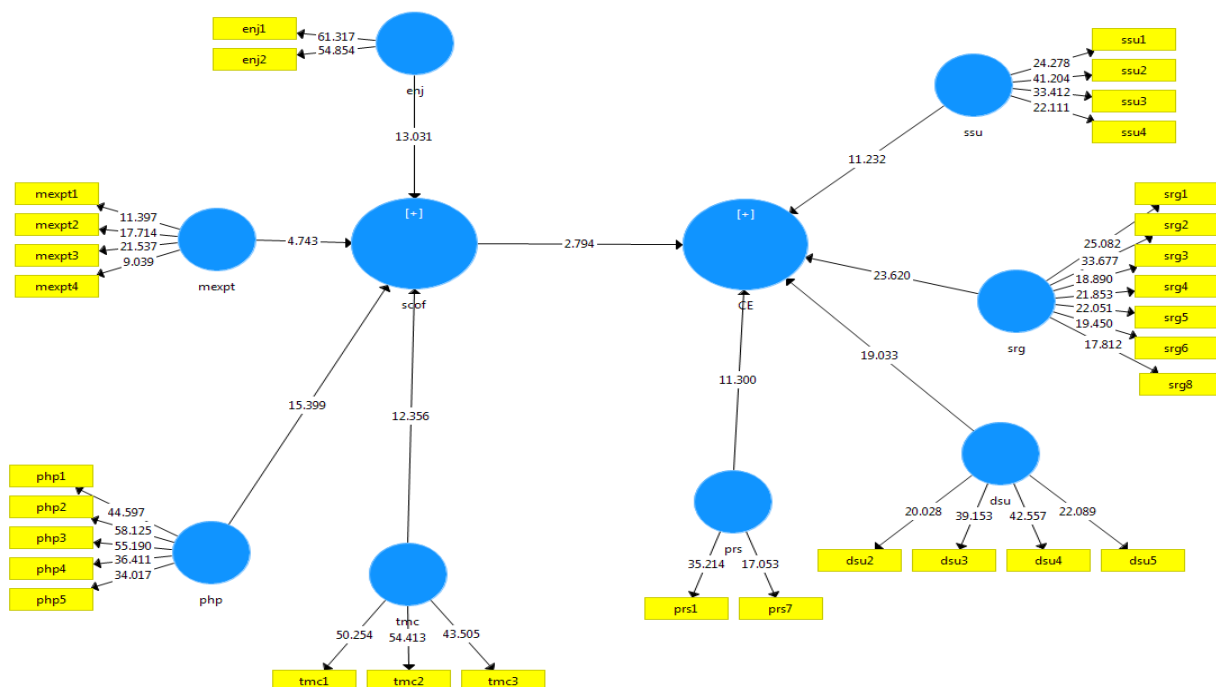
Data were gathered using two established measurement instruments:

1. Students' Conceptions of Feedback Inventory (SCoF): Developed by Elizabeth R. Peterson (2006) during the Assessment and Feedback Project in New Zealand (Peterson & Irving, 2006) and further validated by Brown et al. (2016), this scale measures students' multidimensional perceptions regarding the role and utility of feedback.

2. Cognitive Engagement Sub-scales: Derived from the Attitudes Towards Mathematics (ATM) battery (Miller, Behrens, & Green, 1993; modified by Miller et al., 1996), this sub-scale measures self-regulation, deep strategies, shallow strategies, and persistence. It has been validated across diverse cultures and subject domains (Fredricks & McColskey, 2012; Greene, 2015).

Results

Data were collected from 499 respondents across six universities in Karachi. Female students comprised 42.48% of the sample, males represented 51.50%, and 6.02% did not disclose gender. Partial Least Squares Structural Equation Modeling (PLS-SEM) was conducted using SmartPLS 3.



Reliability and Convergent Validity

Table 1 summarizes the internal consistency and convergent validity of the measurement model. Cronbach's alpha values for all primary constructs exceeded the 0.70 benchmark (Leary, 2004), except for enjoyment and persistence, which consist of two items each (Cronbach's alpha is known to be sensitive to scale length). Composite reliability (CR) values for all constructs exceeded 0.70 (Raykov, 1997). Average Variance Extracted (AVE) values exceeded the 0.50 threshold (Fornell & Larcker, 1981), except for self-regulation which was close to 0.50, demonstrating acceptable convergent validity.

Table 1

Variables	Cronbach's Alpha	CR	(AVE)
dsu (Deep Strategy Use)	0.746	0.841	0.571
enj (Enjoyment)	0.662	0.855	0.747
mexpt (Meet Expectations)	0.713	0.823	0.540
php (Peers Help)	0.876	0.910	0.670
prs (Persistence)	0.434	0.776	0.635
srg (Self-Regulation)	0.803	0.856	0.460
ssu (Shallow Strategy Use)	0.769	0.852	0.590
tmc (Tutor Comments)	0.792	0.878	0.705

Discriminant Validity

Discriminant validity was confirmed using Fornell-Larcker criteria, cross-loadings, and the Heterotrait-Monotrait ratio (HTMT). In Table 2(a), the square root of the AVE for each construct (diagonal values) is greater than its correlations with all other constructs (Fornell & Larcker, 1981). Outer factor loadings were highest on their respective latent variables (Gefen & Straub, 2005). Furthermore, as shown in Table 2(b), all HTMT values fell comfortably below the conservative 0.85 threshold (Henseler, Ringle, & Sarstedt, 2015).

Table 2(a): Discriminant Validity – Fornell-Larcker Criterion

Construct	dsu	enj	mexpt	php	prs	srg	ssu	tmc
dsu	0.755							
enj	0.266	0.865						
mexpt	0.115	0.069	0.735					
php	0.183	0.438	0.139	0.818				
prs	0.451	0.181	0.192	0.097	0.797			
srg	0.520	0.312	0.140	0.245	0.432	0.678		
ssu	0.330	0.202	0.127	0.118	0.309	0.374	0.768	
tmc	0.171	0.400	0.287	0.276	0.163	0.303	0.224	0.840

Table 2(b): Discriminant Validity – Heterotrait-Monotrait Ratio (HTMT)

Construct	dsu	enj	mexpt	php	prs	srg	ssu	tmc
dsu								
enj	0.38							
mexpt	0.20	0.09						
php	0.22	0.57	0.17					
prs	0.78	0.32	0.35	0.16				
srg	0.67	0.42	0.18	0.29	0.72			
ssu	0.42	0.28	0.17	0.14	0.48	0.46		
tmc	0.22	0.55	0.36	0.33	0.28	0.38	0.28	

Structural Model and Hypothesis Testing

Hypothesis testing results are detailed in Table 3. SCoF demonstrated a statistically significant positive effect on Cognitive Engagement ($t = 2.794, p = 0.005$). Furthermore, individual sub-paths within the structural model were highly significant at $p < 0.001$.

Table 3: Structural Path Estimates and Hypothesis Testing Results

Structural Path	Sample (M)	Mean	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
dsu → CE	0.335		0.018	19.033	0.000
enj → scof	0.350		0.027	13.031	0.000
mexpt → scof	0.165		0.034	4.743	0.000
php → scof	0.476		0.031	15.399	0.000
prs → CE	0.181		0.016	11.300	0.000
scof → CE	0.026		0.009	2.794	0.005
srg → CE	0.504		0.021	23.620	0.000
ssu → CE	0.246		0.022	11.232	0.000
tmc → scof	0.340		0.028	12.356	0.000

Discussion

The main goal of this study was to empirically test the effect of Students' Conceptions of Feedback (SCoF) on Cognitive Engagement (CE) of university students in Pakistan. The direct relationship between conceptions of feedback and cognitive engagement has been poorly studied, and Nichols and Dawson (2012) reported that feedback practices are frequently limited to normative comparisons of performance instead of promoting cognitive engagement. Formative assessment and cognitive engagement are both cumulative processes and their empirical combination is necessary for understanding student learning.

The observed positive impact of SCoF on Cognitive Engagement aligns with Butler and Winne's (1995) model of self-regulated learning and Carless and Winstone's (2023) framework of student feedback literacy. When students view feedback as a constructive tool for learning improvement rather than mere grade justification, they actively engage in metacognitive monitoring. Strong structural paths to Self-Regulation ($\beta = 0.504$, $t = 23.620$) and Deep Strategy Use ($\beta = 0.335$, $t = 19.033$) indicate that positive feedback conceptions foster deep analytical processing.

Relational and social dimensions of SCoF specifically Peer Help ($\beta = 0.476$, $t = 15.399$), Tutor Comments ($\beta = 0.340$, $t = 12.356$), and Enjoyment ($\beta = 0.350$, $t = 13.031$) emerged as the primary drivers of feedback conceptions. The results confirm the results of Boud and Molloy (2013) and Steen-Utheim and Wittek (2017) who found that feedback is best provided in a supportive dialogic setting and not as a one-way transmission. If the teacher in the university gives detailed, diagnostic feedback and students are encouraged to give feedback to each other, they see assessment as a joint effort.

Interestingly, SCoF also had a strong correlation with Shallow Strategy Use ($\beta = 0.246$, $t = 11.232$). In the West, surface strategies (e.g., rehearsal and memorization) are commonly considered less effective than deep processing strategies, but in South Asian contexts, students are reported to use surface strategies in conjunction with deep processing strategies to help them cope with the difficulty of the course content (Kember, 2016).

Conclusion

This study presents empirical evidence of the direct positive impact of Students' Conceptions of Feedback on Cognitive Engagement in higher education. Cognitive engagement serves as a pivot to larger behavioral and emotional engagement. This study demonstrates the importance of moving away from the transmission-based grading systems and towards feedback systems that foster feedback literacy, self-evaluation, and dialogic learning, while establishing that positive feedback perceptions are crucial for self-regulation, persistence, and deep learning.

Research Implications and Future Directions

Practical and Educational Implications

1. Student Feedback Literacy: Higher education institutions should provide explicit orientation regarding receiving, processing and responding to feedback to improve self-regulation.
2. Faculty Professional Development: Universities should provide training for academic staff on how to give diagnostic, actionable and encouraging feedback.
3. Peer Feedback: Peer-review tasks should be integrated into the course design, as the construct is very loaded.

Limitations and Future Research Directions

1. Longitudinal Assessment: Longitudinal designs should be used to follow the development of feedback conceptions and engagement over time.
- 2-Future studies should build on the conceptual framework by incorporating behavioral and affective engagement.
3. Institutional Comparisons: Cross comparisons between public/private sectors and STEM vs. humanities fields are recommended.

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