

# Development and Validation of a Learner Interactions Behavioral Observation Checklist (BOC).

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*The goal of instruction is to improve learning by enhanced quantity and quality of interactions between learners, instructors, and content. Several scholars have criticized the use of self-report approaches that collect perceptions of interaction quantity and quality as a measure of instruction and learning quality. To address this, an observational checklist was created based on the concept of Moore's three types of interaction to collect learner interaction data during active instruction. The validation process included a review of existing literature, item development, and content validation. A high Content Validity Ratio of .91 indicated agreement among semi-experts and experts on the relevance and validity of the items included in the instrument.*

## Introduction

The degree of Learner interactions is fundamental in shaping the quality of learning experiences (Marco-Fondevila et al., 2022). as highlighted by Moore's three types of interaction (2006, 2018). Moore (2018) suggests that learner interactions involve observable relationships among learners, instructors, and content and the cognitive learning processes, ultimately leading to quality learning. Learner interactions are widely used as determinant for learning quality across different delivery environments (Bernard et al., 2009; Tenenbaum et al., 2020). However, data collection approach has heavily relied on self-report, which has raised concerns about bias, timing, and memory accuracy (Fredricks & McColskey, 2012). To address these issues, Bailey, D. (2022) suggested the use of evidence-driven approaches like interviews and observations. Particularly, observations offer a valuable means to collect learner interaction data during active instruction, minimizing subjectivity. Therefore, we developed a Behavioral Observation Checklist (BOC) that offers an evidence-driven approach to gather real-time behavioral data during active instruction. This paper briefly covers the development and validation of the BOC.

## Methods

To create a robust tool for collecting learner interaction data, the BOC was developed based on the concept of Moore's three types of interaction (2018). The checklist's items were designed to capture behaviors aligning with the concept of learner-to-learner (L2L), learner-to-instructor (L2I), and learner-to-content (L2C) interactions.

The development and validation of the BOC followed a thorough content validity approach. Four stages were completed in six phases, involving an extensive literature review, item synthesis, refinement, and validation. A total of 17 items (see Table 1) emerged after the first three stages. The validation process engaged seven semi-experts (advanced doctoral students) and twenty experts (experienced researchers) in the field. Each participant was asked to review and complete as directed on an online survey containing 17 items and accompanying open-ended questions.

**Table 1**

*Second consolidation – 17 items: Interactions, Observation items, responses, examples*

Interactions	Observation items	Responses	Examples
Learner-to- Learner	asking other learners questions	Oral/Text	pose questions, problems, or scenarios, seek clarification

Interactions	Observation items	Responses	Examples
		Behavioral	share/show images
Note: learner interactions are likely shown when learners are in proximity; Learners may also prompt/teach other in far proximity online.	responding to other learners' questions	Oral/Text	respond/state, clarify, add example/experience, new question
		Behavioral	share/show/draw/point out images, shake head, raise hand, etc.
	prompting other learners to respond	Oral/Text	encouragement, repeat, re-ask question, prompt peer to respond
		Behavioral	eye prompts, gestural prompts
	commenting on/ responding to other learners prompts	Oral/Text	praise or critique, question, share new/old ideas
		Behavioral	clap hands, thumbs up/down, nodding, pointing
	responding to other learners' comments	Oral/Text	respond/state, repeat, clarify, add example/experience, new question
		Behavioral	nodding, shake head, raise hand, gesture/ move, show/draw images
	responding to others with new responses or questions	Oral/Text	add response, new questions, agree or disagree
		Behavioral	nodding, shake head, raise hand, gesture/ move, show/ draw images
Learner-to- Instructor	learner asks instructor question	Oral/Text	pose questions, problems, or scenarios, seeks clarification
		Behavioral	share/show images
learner and instructor exchanges – learner leads	instructor responds to learner's question	Oral/Text	respond/state, repeat, clarify, add example/experience, new question
		Behavioral	share/show images
	learner comments on instructor	Oral/Text	praise or critique techniques or style, question
		Behavioral	nodding, shake head, gestures, share/show/draw images
	instructor responds to learner's comments	Oral/Text	respond/state, repeat, clarify, add example/experience
		Behavioral	nodding, shake head, gestures, share/show/draw images
instructor and learner exchanges – instructor leads	instructor presents content, objectives, directions, etc.	Oral/Text	state/provide/show/demo, clarify, add examples/experiences
		Behavioral	share/show images
	instructor asks learners questions	Oral/Text	pose questions, problems, or scenarios, prompts
		Behavioral	share/show images pointing out clarifications
	learner responds to instructor's questions	Oral/Text	respond/state, clarify, add example/experience
		Behavioral	share/show/draw/point out images, shake head, raise hand
	instructor gives learners directions, e.g., activity	Oral/Text	group students, give objectives/directions/material
		Behavioral	show/demo/point out expectations
	learner responds to instructor's directions	Oral/Text	pose questions, seek clarity
		Behavioral	Start interactions with team
Learner-to- Content learner visibly engaging with content resources	learner performs task	Oral/Text	describes/ shares/ collaborates/ critiques own work and/or tasks reads, take notes,
		Behavioral	draws/ marks up/ modifies, demonstrates task, conducts experiments, develops deliverable, shares work
	learner completes task	Oral/Text	presents/ showcases/ reflects on deliverables
		Behavioral	posts/ submits

For the semi- experts' data analysis procedures, we use the Statistical Package for the Social Sciences (SPSS) and the Aiken V formula (1980), following established criteria from previous studies (Merino-Soto, 2018; Torres-Luque et al., 2018). A critical value of 0.70 at a significance level of  $p = 0.05$  and 0.81 at  $p = 0.01$  were applied to determine whether items should be retained, modified, or eliminated. Items with values below 0.70 were considered for elimination, while those above 0.81 were deemed retainable. Additionally, an effect size analysis, following Merino-Soto's procedure (Merino-Soto, 2018), was conducted using confidence intervals at a 95% confidence level to assess the generalizability of item clarity.

For experts, the analysis also focused on content validity using Lawshe's content validity index (CVI) (1975). The content validity ratio (CVR) was initially calculated, based on experts' judgments of item relevance using a 4-point Likert scale. Items were categorized as either "+1 essential/relevance" (ratings 1 and 2) or "-1 not essential/relevance" (ratings 3 and 4). Our panel of 20 experts aligned with critical ratio value of .49, thus was used to determine whether items should be retained or deleted. Further analyses included calculating content validity indexes (CVIs) at the item-level (I-CVIs) and scale-level (S-CVI) to establish item relevance. The I-CVI indicated the percentage of agreement among experts on each item's relevance, while the S-CVI showed the percentage of relevant items.

Qualitative data analysis for both semi-experts and experts was based on responses from the open-ended questions. Data were analyzed to identify common areas of consensus regarding specific recommendations.

## Results

Quantitative analysis for the semi-experts confirmed that all items exceeded the critical value of 0.70, indicating strong alignment with their respective categories (L2L, L2I, L2C). Confidence intervals revealed no significant differences between validation questions for each item, suggesting generalizable clarity (see Table 3).

**Table 3**

*Three Aiken's V coefficients for each validation*

Observation Items	V1Item content	V2Oral/text examples	V3Behavior examples
1. asking other learners questions	.929	1.000	.929
2. responding to other learners' questions	1.000	1.000	1.000
3. prompting other learners to respond	.857	.929	.857
4. commenting on/ responding to other learners prompts	.857	.929	.929
5. responding to other learners' comments	.929	.929	.929
6. responding to others with new responses or questions	1.000	1.000	.929
7. learner asks instructor question	.857	.929	.857
8. instructor responds to learner's question	.929	1.000	1.000
9. learner comments on instructor	.929	1.000	1.000
10.instructor responds to learner's comments	.929	1.000	.929
11.instructor presents content, objectives, directions,	.929	1.000	1.000
12.instructor asks learners questions	.929	1.000	1.000
13.learner responds to instructor's questions	.857	.929	.929
14.instructor gives learners directions, e.g., activity	.929	1.000	1.000
15.learner responds to instructor's directions	.929	1.000	1.000
16.learner performs task	1.000	1.000	1.000
17.learner completes task	.929	1.000	1.000

For the experts, all items were deemed relevant based on content validity ratio (CVR) analysis, surpassing the critical value of .49. Item-level (I-CVI) and scale-level (S-CVI/A) calculations further affirmed item relevance, exceeding 79% and 90%, respectively (see Table 4).

**Table 4**

*Values of Content Validity Index (ne-num of experts indicated essential; n-number of experts)*

Observation Items	Ne	n	CVR	I-CVs	Interpretation
1. asking other learners questions	19	20	0.90	0.95	Relevant
2. responding to other learners' questions	19	20	0.90	0.95	Relevant
3. prompting other learners to respond	20	20	1.00	1.00	Relevant
4. commenting on/ responding to other learners prompts	19	20	0.90	0.95	Relevant
5. responding to other learners' comments	17	20	0.70	0.85	Relevant

Observation Items	Ne	n	CVR	I-CVs	Interpretation
6. responding to others with new responses or questions	19	20	0.90	0.95	Relevant
7. learner asks instructor question	16	20	0.60	0.80	Relevant
8. instructor responds to learner's question	20	20	1.00	1.00	Relevant
9. learner comments on instructor	16	20	0.60	0.80	Relevant
10. instructor responds to learner's comments	20	20	1.00	1.00	Relevant
11. instructor presents content, objectives, directions	18	20	0.80	0.90	Relevant
12. instructor asks learners questions	19	20	0.90	0.95	Relevant
13. learner responds to instructor's questions	18	20	0.80	0.90	Relevant
14. instructor gives learners directions, e.g., activity	18	20	0.80	0.90	Relevant
15. learner responds to instructor's directions	18	20	0.80	0.90	Relevant
16. learner performs task	18	20	0.80	0.90	Relevant
17. learner completes task	16	20	0.60	0.80	Relevant
			S-CVI	0.911765	

For qualitative data analysis, semi-experts and experts primarily emphasized the need for terminology clarity and reduction of item overlap. Consideration was given to enhancing the BOC's wording and reducing item redundancy. As a result, a modified version of the BOC was created to better align with the qualitative data feedback.

## Conclusion

Behavioral Observation Checklist's items were found to be valid indicators of learner interactions aligned with the concept of Moore three types of interaction, addressing the need for reliable data collection in the assessment of quality learning and instruction. Most importantly, BOC offers an alternative for collecting real-time behavioral data on learner interactions during active instruction, supporting assessments of quality instructional practices across diverse learning environments. Future research should focus on testing the reliability of BOC in various contexts. Researchers interested in utilizing BOC can contact the authors for access to a modified version of the instrument.

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