

CONSTRUCTIVIST LEARNING ENVIRONMENT SURVEY (CLES)

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November 9, 2025

RECOMMENDED CITATION

mohammad looti (2025). *CONSTRUCTIVIST LEARNING ENVIRONMENT SURVEY (CLES)*. PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=65118>

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Primary Disciplinary Field(s): Educational Psychology, Educational Assessment, Science Education, Pedagogy

1. Core Definition and Purpose

The **Constructivist Learning Environment Survey (CLES)** is a specialized psychometric instrument designed to measure the degree to which a classroom learning environment aligns with the principles of social constructivist pedagogy. Conceived and developed primarily by **Barry J. Fraser** and **Peter Charles Taylor**, the CLES provides educators and researchers with a quantifiable method for assessing students' perceptions of their learning context. Unlike traditional surveys that might focus solely on achievement metrics or teacher behavior, the CLES concentrates on the epistemological underpinnings of the classroom climate, revealing how well the environment facilitates active, collaborative, and meaningful knowledge construction by the learner. Its primary function is diagnostic, enabling critical reflection on pedagogical practices.

The fundamental utility of the CLES lies in its ability to bridge the gap between educational theory and practical classroom implementation. By translating complex constructivist ideals--such as shared control, student negotiation, and critical voice--into measurable statements, the survey allows institutions to systematically evaluate the effectiveness of reform efforts aimed at shifting instruction from transmissive models to interactive, student-centered ones. The data derived from the CLES helps teachers to review their implicit **epistemological presumptions**, often revealing inconsistencies between their stated beliefs about learning and the actual learning experiences perceived by their pupils. This critical feedback loop is crucial for informed professional development and the sustained reform of educational practices, ensuring that changes are evidence-based and relevant to the student experience.

The typical administration of the CLES involves presenting students with approximately thirty statements related to their classroom experiences. These statements are ranked using a **five-point Likert scale**, typically ranging from "Almost Never" to "Almost Always." This structured response mechanism provides reliable quantitative data reflecting the frequency and nature of constructivist interactions within the specific learning environment being studied. Over time, the CLES has been adapted and validated across numerous cultural and disciplinary contexts, establishing itself as one of the most widely recognized and utilized tools for assessing constructivist classroom climate, particularly in science and mathematics education globally.

2. Theoretical Foundations (Constructivism)

The theoretical bedrock of the CLES is **constructivism**, an influential learning theory asserting

that individuals actively construct new knowledge and understandings based on what they already know and believe, particularly through social interaction. This paradigm stands in contrast to behaviorist or objectivist models, which view knowledge acquisition as a passive reception of external information. The CLES operationalizes key tenets of both personal (Piagetian) and social (Vygotskian) constructivism, focusing heavily on how the classroom environment fosters conditions necessary for meaningful cognitive growth, such as opportunities for dialogue, critical questioning, and collaborative problem-solving.

Specifically, the survey is designed to detect the presence of social constructivist elements, recognizing that learning is fundamentally a social process facilitated by interaction with peers, teachers, and cultural tools. Constructivist learning environments are characterized by a shift in authority, where the teacher acts as a facilitator or guide (scaffolder) rather than a sole knowledge provider. The CLES attempts to capture the perceived extent of this shift by assessing dimensions related to shared ownership of the learning process and the valuing of students' subjective viewpoints. A high score on the CLES indicates a student-perceived environment where knowledge is seen as tentative, negotiated, and socially constructed, rather than fixed and transmitted.

The emphasis on the student's perception is a critical philosophical point. Constructivism highlights the subjective nature of reality and learning; therefore, a survey assessing a constructivist environment must necessarily focus on how the environment is experienced by those within it--the students. By utilizing the CLES, researchers gain insight into the "felt" curriculum and climate, which often has a more direct impact on student motivation, engagement, and deep learning outcomes than the stated curriculum intent. The instrument thus serves as a mechanism to ensure that the enacted pedagogy aligns with the core philosophy underpinning major modern educational reforms.

3. Development and Proponents

The development of the CLES began in the late 1980s and early 1990s by Australian educational researchers **Barry J. Fraser**, a leading figure in the field of learning environment research, and **Peter Charles Taylor**, who focused heavily on the epistemological implications of classroom practice. Their collaboration stemmed from the recognized need to move beyond simple assessments of classroom climate (like those focusing on affiliation or task orientation) toward instruments that specifically evaluated the philosophical alignment of the environment with the burgeoning constructivist movement dominating educational theory at the time. This innovation positioned the CLES as a crucial tool for evaluating the success of reform movements that mandated constructivist approaches, particularly in science education where conceptual change was paramount.

Initial iterations of the CLES were meticulously developed through extensive qualitative research, including classroom observations and interviews with teachers and students, to ensure the resulting items truly reflected constructivist teaching behaviors and student experiences. This rigorous development process, which included factor analysis and validation studies, led to the establishment of the five distinct scales that define the instrument. The researchers sought to create a versatile instrument that could be used both retrospectively (to evaluate existing environments) and proactively (to guide curricular development and intervention design).

Fraser and Taylor's work significantly contributed to the literature on educational assessment by formalizing the measurement of epistemological climate. Their subsequent publications provided robust evidence of the CLES's reliability and validity across various settings. Furthermore, their efforts encouraged the adaptation and translation of the CLES into dozens of languages and cultures, leading to a worldwide consensus regarding the dimensions critical for fostering effective constructivist learning. The continuous refinement and validation of the instrument underscore the commitment of its proponents to providing a research-backed tool for enhancing student learning experiences globally.

4. Structure and Dimensions (The Five Scales)

The standard, most frequently used version of the CLES consists of thirty statements, divided equally into five distinct scales, each measuring a critical dimension of the constructivist learning environment. Each scale focuses on a specific aspect of the classroom experience perceived by the students. The consistent five-factor structure is central to the CLES's psychometric integrity and theoretical grounding, allowing for detailed, profile-based analysis rather than relying on a single aggregate score.

The five core scales are designed to capture the essence of student empowerment and epistemological relevance within the learning process:

Personal Relevance (PR): This scale assesses the extent to which the learning material and activities are connected to students' existing knowledge, interests, and real-life experiences outside the classroom. High scores indicate that students perceive the curriculum as relevant and meaningful to their personal lives, which is a key motivator in constructivist learning.

Uncertainty of Science/Knowledge (US): This dimension measures whether students perceive knowledge (or scientific knowledge, depending on the context) as dynamic, tentative, and evolving, rather than fixed, absolute, and immutable. This is vital for promoting critical thinking and discouraging rote memorization, as constructivism emphasizes the human-made nature of knowledge.

Critical Voice (CV): This scale assesses the degree to which students feel they are allowed and

encouraged to express criticism, ask challenging questions, and share their concerns regarding the learning activities, teaching methods, and even the established curriculum. It reflects the democratic nature of the learning environment and student empowerment.

Shared Control (SC): This dimension evaluates the extent to which students perceive shared ownership in the planning, implementation, and assessment of learning activities. This includes opportunities for students to influence lesson topics, choose methods of investigation, or participate in determining evaluation criteria, promoting autonomy and responsibility.

Student Negotiation (SN): This scale measures the opportunities provided for students to communicate with each other and the teacher to clarify, debate, justify, and challenge their emerging understandings. High negotiation indicates a collaborative environment where meaning is constructed through social discourse and peer interaction.

These five dimensions collectively provide a holistic profile of the classroom climate, highlighting areas where constructivist principles are effectively implemented and areas that require pedagogical adjustment. For instance, a classroom might score highly on Personal Relevance but poorly on Shared Control, indicating that while content is relatable, the methodology remains teacher-centered. This diagnostic precision is what makes the CLES a powerful tool for targeted intervention.

5. Administration and Scoring

The administration of the CLES is typically straightforward, facilitating its use across large populations and diverse educational settings. The survey is generally administered to students anonymously to ensure honest and reflective responses regarding their perceptions of the classroom environment. While the original version was paper-based, modern applications often utilize digital platforms, allowing for faster data collection and analysis. Standard instructions guide students to reflect on their experiences within a specific class (e.g., their current math or science class) over a defined period.

The core measurement mechanism is the **five-point Likert scale**, where students rate the frequency of the described occurrence using anchors such as 1 = Almost Never, 2 = Seldom, 3 = Sometimes, 4 = Often, and 5 = Almost Always. This ordinal scale allows the perception of frequency to be quantified. A crucial aspect of the CLES is that some items are worded negatively and must be reverse-scored during analysis. This technique is standard in survey design to mitigate response bias (such as acquiescence bias) and ensure that respondents are attentively reading the statements before answering.

Scoring involves calculating the mean score for each of the five dimensions (Personal Relevance, Uncertainty of Science/Knowledge, Critical Voice, Shared Control, and Student Negotiation).

These mean scores are then typically compared against normative data or against the teacher's stated preferred learning environment (using a parallel form of the CLES, known as the CLES-T or Ideal CLES). Significant discrepancies between the students' perceptions (Actual CLES) and the teacher's preferences (Ideal CLES) often signal areas needing immediate pedagogical attention. Furthermore, statistical analysis, particularly correlation and regression, is frequently employed to link CLES scores to student outcomes, such as attitude toward the subject, motivation, or conceptual understanding gains.

6. Applications in Educational Research and Practice

The CLES has proven invaluable in educational research, serving as a robust dependent or independent variable in studies investigating the efficacy of constructivist teaching methodologies. Researchers frequently use the CLES to compare traditional, teacher-centered classrooms with reform-oriented, student-centered classrooms, consistently finding that environments scoring higher on CLES dimensions are associated with improved student attitudes, reduced anxiety, and higher levels of self-efficacy in complex subjects like physics and chemistry. The instrument allows for detailed cross-sectional and longitudinal studies documenting the sustained effects of large-scale curriculum reforms.

In educational practice, the CLES is primarily used as a diagnostic tool for **professional development**. When teachers receive feedback showing that their students do not perceive opportunities for Shared Control or Critical Voice, this data provides a concrete basis for self-reflection and professional growth. This feedback mechanism shifts the focus from simple performance metrics to the quality of the learning process itself. Workshops and training sessions can then be tailored precisely to help educators develop specific skills required to enhance those particular dimensions that are perceived as lacking by their students.

Moreover, the CLES can be administered repeatedly throughout a school year to monitor changes in the learning environment climate following specific interventions. For example, if a teacher implements a new project-based learning module designed to increase student autonomy, a pre- and post-administration of the CLES can quantitatively measure if the students perceived a corresponding increase in Shared Control and Personal Relevance. This evidence-based approach to pedagogical change ensures accountability and efficacy in reform efforts, moving educational practice toward continuous, data-driven improvement cycles.

7. Psychometric Properties and Validity

A key factor contributing to the widespread acceptance of the CLES is its well-established **psychometric robustness**. Extensive validation studies across numerous countries and contexts have consistently demonstrated high levels of internal consistency, typically measured using

Cronbach's alpha, for each of the five scales. These reliability coefficients generally exceed 0.70, often reaching 0.85 or higher, confirming that the items within each scale reliably measure the intended underlying construct.

Validity evidence for the CLES is equally strong, encompassing several crucial types. **Construct validity** is supported by factor analysis, which consistently confirms the five-factor theoretical structure proposed by Fraser and Taylor, demonstrating that the scales are empirically distinct yet related dimensions of the constructivist environment. Furthermore, **predictive validity** has been repeatedly established through studies showing significant positive correlations between higher CLES scores and desirable cognitive and affective student outcomes, such as conceptual understanding, positive attitudes toward science, and increased inquiry skills.

The CLES also possesses strong **cross-cultural validity**. Its successful translation and adaptation into languages ranging from Chinese and German to Hebrew and Spanish attest to the universality of its underlying constructivist dimensions. While minor cultural adaptations are sometimes necessary for specific item wording, the fundamental five-scale structure has proven remarkably stable, making the CLES a reliable instrument for comparative international educational research. This rigorous validation process ensures that the findings derived from the survey are trustworthy and generalize across diverse educational settings.

8. Limitations and Adaptation

Despite its strengths, the CLES is not without limitations. One primary criticism relates to its inherent focus on student perception, meaning it captures the subjective experience of the environment rather than an objective measure of teacher behavior. While subjective experience is vital to constructivism, researchers must often pair CLES data with observational protocols or teacher interviews to gain a complete picture of the classroom dynamics. Furthermore, the instrument is generally constrained to secondary and tertiary educational settings, as the literacy and cognitive maturity required to accurately interpret and respond to the abstract statements about epistemology (e.g., Uncertainty of Knowledge) limit its applicability in very young primary school grades.

Another challenge relates to the potential for socially desirable responses, particularly if students perceive that their answers might influence their grades or teacher relations, even when anonymity is guaranteed. While the five-point Likert scale attempts to minimize floor and ceiling effects, the complexity of the philosophical concepts being assessed (like Shared Control) can sometimes lead to misunderstandings among students who have only experienced highly traditional learning models. Interpretation requires careful contextualization within the specific school culture.

To address specific disciplinary or educational needs, several significant adaptations of the CLES have been developed. These include the **Technology-Rich Constructivist Learning**

Environment Survey (TCLES), which incorporates dimensions related to the use of digital tools and online collaboration, and tailored versions for specific subjects like mathematics or vocational education. These adaptations maintain the core five dimensions but adjust the specific item wording to maximize relevance and validity within specialized contexts, ensuring the CLES framework remains a versatile and evolving measurement tool in contemporary educational research.

Further Reading

[Peter Charles Taylor's Academic Profile \(Macquarie University\)](#)

[Barry J. Fraser's Research Portfolio \(Google Scholar\)](#)

[Constructivism \(Philosophy of Education\) - Wikipedia](#)

[Likert Scale - Wikipedia](#)