Sustainable Quality Enhancement in Higher Education Learning and Teaching

Integrative Core Dataset and Performance Data Analytics

Acronym: SQELT

Grant co-funded by European Union (Erasmus+ Projects)
Key Action: Cooperation for Innovation and the Exchange of Good Practices
Action: Strategic Partnerships
Main objective of the project: Development of Innovation

5th Transnational Project Meeting & 1st Multiplier Event
Danube University Krems (DUK), Krems, Austria, 1-2 July 2019

https://www.evalag.de/sqelt
Justifying and Contextualising Performance Indicators of Learning and Teaching: The Role of Theories of Learning and Teaching

Theodor Leiber

evalag (Evaluation Agency Baden-Wuerttemberg), Mannheim, Germany
Overview

- **SQELT** strategic partnership & case study & goals & methodology

- **Basic Elements of Performance Data Governance & Management (PDGM) in Learning and Teaching (L&T)**

- **Theories of Learning and Teaching (TOLT) and Their Models**

- **Justification and Contextualisation of Performance Indicators (PIs) of L&T:** The complicated interweaving of types of performance, indicators and learning theories
## Strategic partnership and case study

<table>
<thead>
<tr>
<th>Country</th>
<th>University</th>
<th>Characteristics</th>
<th>No. students</th>
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</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Danube University Krems</td>
<td>Further education</td>
<td>9,000</td>
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<tr>
<td>Belgium</td>
<td>Ghent University</td>
<td>Comprehensive university</td>
<td>41,000</td>
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<tr>
<td>Italy</td>
<td>University of Milan</td>
<td>Comprehensive university</td>
<td>63,000</td>
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<tr>
<td>Poland</td>
<td>Jagiellonian University Kraków</td>
<td>Comprehensive university</td>
<td>44,000</td>
</tr>
<tr>
<td>Portugal</td>
<td>University of Aveiro</td>
<td>Natural, social, engineering, medical sciences; polytechnics profile; Public foundation under private law</td>
<td>15,000</td>
</tr>
<tr>
<td>UK</td>
<td>Birmingham City University</td>
<td>Health social, engineering sciences; business and law; art, media and design; Polytechnics roots</td>
<td>24,000</td>
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<tr>
<td>Germany</td>
<td>evalag</td>
<td>HE research, evaluations, accreditations, counseling</td>
<td>n/a</td>
</tr>
<tr>
<td>Netherlands</td>
<td>M. Beerkens, Uni Leiden</td>
<td>External expert</td>
<td>–</td>
</tr>
<tr>
<td>Norway</td>
<td>B. Stensaker, Uni Oslo</td>
<td>External expert</td>
<td>–</td>
</tr>
<tr>
<td>Portugal</td>
<td>C. Sarrico, CIPES</td>
<td>External expert</td>
<td>–</td>
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</tbody>
</table>
Goals and methodology

Workflow (schematic main steps) of SQELT project (updated)

SQELT Project Group (SPG)

Collecting & analysing existing definitions of PIs in L&T
(e.g., AHELO; Creative Classroom Research Model; U-Multirank; HEC Reports; Teaching Excellence Framework Criteria/HEFCE; Program Accreditation; research literature)

Development of initial integrative PI data set & other basic elements of PDGM

Discussion & (self-)evaluation of SQELT results (feedback proc.)

Further improvement of basic elements of PDGM based on feedback

Set up of PDGM model

Implementation of PDGM model in pilot HEIs

Collecting feedback (surveys) on PDGM model implementation from pilot HEIs & refinement of model

Six pilot HEIs

Project partners
- evalag (Evaluation Agency Baden-Wuerttemberg)
- Six (pilot) HEIs from six European countries (incl. students, leadership, QA managers, teachers)

External experts
- International experts in HEI research, performance data management (PDM) and performance data analytics (PDA)
- European Networks in Higher Education (e.g., ENQA, EUA, EURASHE, ESU)
- Representatives of Higher Education Politics (e.g., ministries of education, science and arts)

Publications: Practice-Manual on PDGM Model(s); academic publication(s)
Goals and methodology

- Two main goals: **individual benchlearning** at partner HEIs & **intensive case study** including **generic results** (e.g. SQELT Manual; publications) (e.g. Leiber, 2019b)

- Aims at **comprehensive set of performance indicators** (PIs) for L&T and their **PDGM framework** (comprehensive: of large scope; covering or involving much; inclusive; thorough; far-reaching; broad; widespread; detailed; cross-disciplinary)

- Builds on **available scholarly models of PDGM in L&T, research literature, benchlearning** and **surveys** with respect to PDGM models of **sample HEIs**, and **external experts’ knowledge**

- Builds on **various PI models** (e.g. AHELO; Creative Classroom Research Model (Uni Leuven); **U Multirank**; HEC Reports; TEF/HEFCE; Program Accreditation; **NSSE Engagement Indicators**; **QILT** (Australian Quality Indicators for L&T); …)

### Outputs of SQELT project

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<tr>
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Benchlearning is a way of monitoring and assessing the strategies and performance of an organization against comparable, good-practice competitors; it includes an ongoing performance improvement strategy and change management process.

“Best practice is a myth”
(Fernie and Thorpe, 2007, p. 328)
Basic elements of PDGM

For the pursuit of these goals the following is “helpful”:

• Identification of Stakeholders & usage of performance data – generic –

• Actionable **Performance Data Governance & Management Policy (PDGMP)** (& its various supporting documents) – generic –: Indispensable for HEIs as autonomous, multiple-hybrid organisations: regulates issues of governance & strategy; ethics & responsibility, including sustainability; quality, accessibility & usability of information & data (about student lifecycle); investments of human & financial resources.

• (Digital) **PDM System** is required that makes performance data/information operational and coherent. – ‘quasi-generic’ –

• Suitable **set of PIs** to monitor, measure & report information & data related to L&T – ‘quasi-generic’, comprehensive –

• **Systematic & ongoing reflection** of methodological & ethical issues of PDGM is essential to secure validity, reliability, moral values. – (theoretically) generic (in the EU) –

• Vivid PDGM culture: sufficiently widespread understanding of PDGM ownership & related interpretation capabilities & evidence-based decision-making
Few selected arguments for PIs:

‘PIs can be defined as concepts that represent **qualitative and quantitative** information and data, which **indicate** functional qualities (‘performance’) of institutional, organisational or individual performance providers. As such, PIs provide information about the degree to which quality performance objectives [can be or] are being met. This **modelling perspective** seems to be indispensable for any systematic approach to QM, particularly development-oriented QM in HEIs’ (Leiber, 2019b, 77).

- PIs are **(only) indicating** something about their related performance; PIs are **not “complete or perfect images”** of their related performance.

- ‘PIs **reflect the quality goals** (‘targeted performance’) of institutions, institutional units and programmes’ (Leiber 2019b, 77), in more direct or more indirect ways.

- PIs can ‘open the way to objectify communication and operationalisation of quality relevant features and, in the case of quantitative PIs, measure them’ (Leiber 2019b, 77).
Basic elements of PDGM

Few selected arguments for PIs:

• ‘PIs are used by HEIs for two primary reasons
  • to facilitate monitoring, assessing and evaluating their performance for the purposes of internal or external QM (for example, in audits, evaluations and accreditations)
  • to provide information to the financiers (e.g., government, taxpayers) and potential beneficiaries (e.g., students, broader public) for accountability and reporting purposes’ (Leiber 2019b, 77).

• ‘PIs are used at the national and international level mainly
  • to ensure accountability for public funds
  • to facilitate national and international comparisons of HEIs, e.g., by […] [benchlearning], ratings and rankings, which are based on PIs’ (Leiber 2019b, 77)

• ‘[…] single PIs, or single types of PIs will usually sketch trends and reveal interesting questions. Due to the performance complexity of the social multiple-hybrid organisations called HEIs, single PIs do not, as a rule, provide objective explanations that exhaustively cover a certain performance area or achievement. […] the measurement of single PIs normally does not permit immediate conclusions for quality improvement measures to be drawn in the sense of the Deming quality cycle. […] PIs need to be interpreted and contextualised in light of manifold information concerning strategies, purposes and operation at institutional and programme levels. Accordingly, multiple sources of both quantitative data and qualitative information are needed to make PIs really informative about quality performance and make them a source of evidence for implementing enhancement measures’ (Leiber 2019b, 77-78).
Some research questions of the SQELT case study

- **Theory-basedness of PIs**: How can PIs of L&T be justified by, or “derived from” L&T theories?
- **Integrative data management system**: How would a (digital) PDM System (incl. software solutions) allow for integration of data from different sources? How generic can suggested PDM System models be?
- **Aggregation levels of PIs**: Differentiation of “aggregate data” and “base data” – PIs & simple PIs? – further classification & relations of PIs (list) necessary, useful, …?
- **Data analytics and data privacy**: Clarify, harmonise (?) different ethical regulations in different countries and HEIs.
- **Performance data policy**: Consensus on a PDGM Policy (docu
A model of the L&T process in HEIs, schematic (Leiber, 2019, p. 82);
Six typical learning steps
Open for any elaborate theory of learning & teaching
# Theories of Learning and Teaching (TOLT) and their Models

## (Cognitive) Information Processing

Atkinson, Davies, Gagne, Shiffrin, Wallace

## Computer (Programme) Models; Developmental Psychology Models; Neural Models

(e.g. artificial neural networks/Deep Learning)

### Behaviouristic

Guthrie, Hull, Pavlov, Skinner, Thorndike, Tolman, Watson

- **Focused purpose of learning/education**: Produce behavioural change in desired direction

### Cognitivist

Ausubel, Bruner, Chomsky, (Engeström), Gardner, Koffka, Kohler, Lewin, (Piaget)

- **TOLT models (random selection)**: Stimulus/(black box)/response model
- **Bloom’s Taxonomy**: (knowledge; comprehension; application; analysis; synthesis; evaluation)
- **Multiple Intelligences** (7 learning styles: musical-rhythmic, visual-spatial, verbal-linguistic, bodily kinesthetic, interpersonal, intrapersonal, and naturalistic) (Gardner)

### Social

Bandura, (Boud), Engeström, Erut, Jarvis, Mezirow, (Piaget), Rotter, Salomon, (Vygotsky), Wenger

### Constructivist

Boud, Candy, Dewey, Illeris, Kegan, Mead, Mezirow, Piaget, Rogoff, Taylor, von Glasersfeld, Vygotsky

### Humanistic

Maslow, Mezirow, Rogers

- **Basic mechanism type**: Dialectical, non-linear, multi-causality, iteratively reinforcing

## Focused Purpose of Learning/Education

- **Transformative learning**
- **Self-directed learning**

- **Transformative learning** (perspectives of transformation: self; beliefs; behaviour)
- **Self-directed learning (SDL)**
- **“Zone of Proximal Development” & “Scaffolding”** (Vygotsky)

## Teacher Personality Models

(e.g. 5-Factor) (Goncéz, 2017)

## Basic Mechanism Type

- **Linear-(mono-) deterministic, iteratively reinforcing**

## Transformative and Holistic Continuing SDL (THCSDL) Theory

(Du Troit-Brits, 2018)
Theories of learning and teaching and their models

A model of **Cognitive Information Processing**

Open for any elaborate theory of learning & teaching

Source: [https://www.tcd.ie/Education/ICT/unit02/explanation03b.htm](https://www.tcd.ie/Education/ICT/unit02/explanation03b.htm)
Transformative and Holistic Continuing Self-Directed Learning (THCSDL) theory attempts to model ‘a meaning-making holistic personal development process transforming students into mature, self-actualized, self-engaged, independent and empowered individuals that have the mind-set of growth [better: enhancement], aptitude/capability of taking ownership, authentic control of and accountability for their learning, and in so doing, fostering intellectual openness to evolve into self-directed lifelong goal-oriented students’ (Du Toit-Brits, 2018, 62).
### 6 TOL(T) Core assumptions & mechanisms relevant to L&T

<table>
<thead>
<tr>
<th>Cognitive Information processing</th>
<th>Core assumptions &amp; mechanisms</th>
<th>Selected core aspects relevant for L&amp;T performance and PIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning by complex internal processing and reinforcement (&quot;deep learning&quot;)</td>
<td>Consideration of the complex “three-level processing” when designing L&amp;T processes, learning outcome assessments and L&amp;T environment</td>
<td><strong>Capture observable performance &amp; behavioural objectives/outcomes</strong></td>
</tr>
<tr>
<td>Simultaneous “three-level processing” (SR; STM; LTM)</td>
<td>Option of digitisation of performance data and analysis</td>
<td><strong>Capture observable satisfaction</strong> of stakeholders</td>
</tr>
<tr>
<td>Behaviouristic</td>
<td>Learning is directly affected by rewards, absence of rewards, or punishment</td>
<td>Provision of adequate, frequent and clear feedback based on assessments and evaluations including PIs</td>
</tr>
<tr>
<td>Learning by reinforcement is based on feedback</td>
<td>Use of incentive systems based on PIs</td>
<td><strong>Active discovery learning</strong> (e.g. cooperative learning, problem-based learning, research-based learning, case studies, hands-on experiments)</td>
</tr>
<tr>
<td>Focus on (changes in) observable behaviour</td>
<td></td>
<td><strong>Critical thinking and self-determination</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Student-centredness of L&amp;T</strong></td>
</tr>
<tr>
<td>Cognitivist</td>
<td>Knowledge and learning are based on symbol manipulation and connection (symbol systems: syntax, semantics)</td>
<td><strong>Social-in-group and community-based learning</strong> (e.g. cooperative and collaborative learning, situated learning, discussion and debates, group work)</td>
</tr>
<tr>
<td>Learning occurs as systemic extension of syntax and semantics of previous knowledge and skills</td>
<td></td>
<td><strong>Student-centredness of L&amp;T</strong></td>
</tr>
<tr>
<td>Learners are actively involved in generating knowledge and skills</td>
<td></td>
<td><strong>Responsibility of learners for their learning process (SDL)</strong></td>
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<td></td>
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<td><strong>L&amp;T/HEI performance as a holistic phenomenon</strong></td>
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<tr>
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<td></td>
<td><strong>Learning as dialogic and recursive processes</strong> (e.g. cooperative and collaborative learning, discussion and debates, group work, self-directed learning)</td>
</tr>
<tr>
<td>Social</td>
<td>Learning is an interactive social process (situated learning; communities of practice; distributed cognition; intercultural experience and learning)</td>
<td><strong>Student-centredness of L&amp;T</strong></td>
</tr>
<tr>
<td>Constructivist</td>
<td>Learning is an interactive social process and knowledge is actively constructed in and by contextualised situations</td>
<td><strong>Responsibility of learners for their learning process (SDL)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>L&amp;T/HEI performance as a holistic phenomenon</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Learning as dialogic and recursive processes</strong> (see above)</td>
</tr>
<tr>
<td>Humanistic</td>
<td>Humans are intrinsically motivated for self-determination, self-actualisation and learning; personality development is core</td>
<td><strong>Student-centredness of L&amp;T</strong></td>
</tr>
<tr>
<td>Learning motivation and success depends upon a hierarchy of needs (physiological, psychological, intellectual)</td>
<td></td>
<td><strong>Critical thinking and self-determination</strong></td>
</tr>
<tr>
<td>Learning involves both affective and cognitive enhancement</td>
<td></td>
<td><strong>L&amp;T/HEI performance as a holistic phenomenon</strong></td>
</tr>
</tbody>
</table>
# Justification and Contextualisation of Performance Indicators (PIs) of L&T: The complicated interweaving of types of performance, indicators and learning theories

<table>
<thead>
<tr>
<th>Performance types</th>
<th>Performance sub-types</th>
<th>(“Non-simple”) PIs and their measures/performance measurement methods</th>
<th>Mainly, directly involved TOL(T)</th>
<th>Indirectly involved TOL(T), mediated across complicated, sometimes tiny, mechanisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning resources</td>
<td>Organisation of study programmes</td>
<td><strong>Assessment</strong> survey of students about <strong>organisation of study programmes</strong> (e.g. transparency of entrance requirements/admission regulations; access to classes; average class size; completeness of courses offered compared to the study guide; <strong>transparency of the examination system</strong>; opportunity offers for <strong>studying abroad</strong>; possibility of inclusion of study periods abroad) <strong>Assessment</strong> survey of teaching staff about organisation of study programmes <strong>Expert/peer assessment</strong> (report) about organisation of study programmes</td>
<td><strong>Social</strong> (performance options for intercultural experience and learning)</td>
<td>Aspects of <strong>Self-directed learning</strong> (SDL)</td>
</tr>
<tr>
<td>Supportive environment</td>
<td><strong>Personality development</strong> and well-being of students (social and societal competences)</td>
<td><strong>Satisfaction</strong> survey of students about measures of encouraging contact among students from different backgrounds (social, ethnic, religious)/provision of opportunities for students to be involved socially/provision of student support for managing non-academic responsibilities (e.g. work, family)/experience in discussions with diverse others</td>
<td><strong>Humanistic</strong> (performance options for intercultural, social, non-academic experience and learning)</td>
<td>Aspects of <strong>Bloom’s Taxonomy</strong> Aspects of “<strong>Multiple Intelligences</strong>“</td>
</tr>
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</table>

(Leiber, 2019)
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</tr>
</thead>
<tbody>
<tr>
<td>Quality of teaching staff, quality teaching and teaching staff engagement</td>
<td>Teaching staff recruitment</td>
<td>Expert assessment and/or assessment survey of students and/or assessment survey of teaching staff of recruitment procedures (e.g. procedural responsibilities; recruitment and selection process; recruitment quality criteria) for lecturers/associate professors/full professors (e.g. teaching skills, pedagogic skills, research success)</td>
<td>Social (performance options for intercultural experience and learning)</td>
<td>Transformative learning</td>
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<td></td>
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<td>Teacher personality models (e.g. 5-Factor)</td>
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<td>Cognitive Information Processing theory THCSDL</td>
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</tr>
</thead>
<tbody>
<tr>
<td>Quality learning and student engagement</td>
<td>Student interactions with learning content</td>
<td>Number of students and their identity and duration of their interactions with course activities (e.g. solution of exercises, watching videos, listening to lecture, participation in working groups) based on reports generated from Learning Management Systems (LMSs) and Learning Analytics tools</td>
<td>Cognitivist</td>
<td>Transformative learning</td>
</tr>
<tr>
<td>Quality learning and student engagement</td>
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<td>Social (performance options for intercultural experience and learning)</td>
<td>Active discovery learning</td>
</tr>
<tr>
<td>Quality learning and student engagement</td>
<td>Student interactions with learning content</td>
<td>Assessment survey of students about their dispositions, values and attitudes towards learning, that is collection of learner data and pedagogical descriptors (e.g. students’ ability in deactivating negative learning emotions, students' learning strategies)</td>
<td>Constructivist</td>
<td>Social-in-group and community-based learning</td>
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<tr>
<td>Quality learning and student engagement</td>
<td>Student interactions with learning content</td>
<td>…</td>
<td>Cognitive Information Processing theory</td>
<td>Learning as dialogic and recursive processes</td>
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<td>Quality learning and student engagement</td>
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<th>Performance types</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Constructive alignment of study programmes / courses</td>
<td>Learning outcomes</td>
<td>Expert assessment and/or satisfaction survey of students and/or satisfaction survey of teaching staff about intended learning outcomes (e.g. clear formulation and transparency of goals of study modules and courses)</td>
<td>Aspects of Bloom's Taxonomy</td>
<td>Goal-directed learning</td>
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<td>Expert assessment about teaching staff awareness of existing intended learning outcomes</td>
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<td></td>
<td>Expert assessment/ student satisfaction survey/ teaching staff satisfaction survey about design and adjustment of teaching and assessments/ examinations to defined intended learning outcomes</td>
<td>All TOLTs</td>
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<td>Learning-oriented assessment practices:</td>
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<td>Tasks as learning tasks (authentic)</td>
<td>Cognitivist (performance options for developing cognitive and emotive capacities and skills experience and learning)</td>
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<td>Self-assessment and peer assessment</td>
<td>SDL</td>
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<td>Feedback to determine learning potential</td>
<td>Social (performance options for intercultural, social, non-academic experience and learning)</td>
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<td>Examination practices:</td>
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<td>Do not reflect assessment for learning</td>
<td>Humanistic (performance options for self-directed learning and self-determination)</td>
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<td>Teacher-centred</td>
<td>Constructivist</td>
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<td>Student learning gain</td>
<td></td>
<td>Assessment survey of students and/or assessment survey of teaching staff about learning gain in subject-matter competences (e.g. by random control trials and/or comparison of knowledge and skills before and after learning phases, including examination grades and earned credit points)/ in methodological competences/ in higher-order learning/ in reflective and integrative learning/ in learning strategies and self-learning competences/ in quantitative reasoning/ in collaborative learning/ in digital skills/ in interdisciplinary competences/ in transdisciplinary competences/ in social competences (e.g. team, communication and leadership competences; empathy; ability to cooperate; ability to solve conflicts)/ in self-competences (e.g. self-determination; capability of decision and learning; flexibility of action; ability to reflect; sovereignty)</td>
<td>All TOLTs</td>
<td>Cognitivist (performance options for developing cognitive and emotive capacities and skills experience and learning)</td>
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<td></td>
<td></td>
<td></td>
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<td>Humanistic (performance options for self-directed learning and self-determination)</td>
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<td>Constructivist</td>
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Thank you very much for your attention!
References


https://www.evalag.de/sqelt
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