The Criteria of Inquiry Learning Inventory (CILI)

This finalized inventory – first published by Reitinger (2016) – can be used as a standardized inventory to measure the evolvement of Inquiry Learning within educational learning settings in tertiary education.

Instruction: „Please rate the statements below with regard to the experienced X, termed hereafter as learning activity!“ (X stands for the considered concrete learning activity, e.g. didactics seminar, physics lesson, scientific workshop, cooking class, language course, pedagogic project, etc.)

(a) This learning activity encouraged me to discover open questions.
(b) Many situations occurred where I was able to tell my ideas.
(c) This learning activity led me to suppositions about possible solutions.
(d) I gained exciting insights into the matter through exploration.
(e) I definitely want to do more with the insights I have gained during this learning activity.
(f) I remember many interesting conversations during this learning activity.
(g) At this learning activity, many suppositions came to my mind.
(h) During this learning activity, I found out new insights by myself.
(i) I have many ideas about meaningful things I can do with the new insights.
(j) This learning activity was full of meaningful discussions.
(k) I thought about possible solutions.
(l) This learning activity gave me ideas for interesting further activity.

Items (a), (d), and (h) refer to authentic exploration (*auex*).
Items (b), (f), and (j) refer to critical discourse (*crdi*).
Items (c), (g), and (k) refer to experience-based hypothesizing (*exhy*).
Items (e), (i), and (l) refer to conclusion-based transfer (*cotr*).

All Items are anchored on the following scale:
1 = “not true at all”; 2; 3; 4 = “somewhat true”; 5; 6; 7 = “very true”.

Reference

Reitinger, J. (2016): Selbstbestimmung, Unvorhersagbarkeit und Transparenz: Über die empirische Zugänglichkeit forschenden Lernens anhand des Criteria of Inquiry Learning Inventory (CILI). In S. Schude & K. Moegling (Eds.), *Transparenz im Unterricht und in der Schule. Forschungsergebnisse und Diskussion* (pp. 42–69). Immenhausen bei Kassel, Germany: Prolog.

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About the Nature and Empirical Accessibility of Inquiry Learning. *Schulpädagogik heute*, 6(2), 1–15.
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The Criteria of Inquiry Learning Inventory (CILI) derives from the Theory of Inquiry Learning Arrangements (TILA):

The Theory of Inquiry Learning Arrangements (TILA)

The framework TILA (Reitinger 2013, pp. 186–189) synthesizes the self-determination-oriented and inquiry-related premises quoted above by conflating the earlier roots of inquiry learning coined by Dewey (1933) with contemporary approaches (Moegling 2010, p. 100; Reich 2008; Patry 2001) and psychological findings (Ryan & Deci 2004; Reeve 2004; Roth 2009) as well as arguments represented by the European Bildungstheorie (Benner 2012, 2011; Klafki 1999).

TILA is resembled of three frame constructs. These are:

- The action-orchestrating frame construct: This frame construct includes a set of educational principles. Its recognition within preparation, performance, and reflection of learning arrangements features a beneficial effect on the learning process (Reitinger, Haberfellner, & Keplinger 2015, pp. 3–4). These principles are not explicitly content of the paper at hand and are therefore not considered in detail.
- The organizational frame construct: The process of organization described by this frame construct refers to a model published by the author under the acronym OPeRA (Reitinger 2013).
- The definitional frame construct: This frame construct embraces the definition of inquiry learning by stating indispensable elements, so called criteria of inquiry learning (Reitinger 2013, p. 186).

The definitional frame construct includes six definitional criteria in total. The assertion that a learning arrangement is a kind of inquiry learning depends by definition on the occurrence of these criteria within the learning arrangement concerned. Hence, these criteria play a crucial role as indicators of inquiry learning arrangements. Reitinger (ibid., p. 43) differentiates two categories of criteria of inquiry learning. On the one hand, he speaks about inquiry-related dispositions (discovery interest, method affirmation), which play an important motivational role. On the other hand, he derives from respective literature and research four inquiry-related action domains (experience-based hypothesizing, authentic exploration, critical discourse, conclusion-based transfer; ibid., p. 44), which characterize the act of self-determined inquiry itself:

Discovery Interest

Inquiry learning is motivated by a general discovery interest. In this context, Roth (2009, p. 68) expresses himself in a trivial, albeit persuasive, manner: “Was einen brennend interessiert, das lernt man schnell, während das, was einen nicht fesselt, schwer zu lernen ist.“ According to Kashdan, Matthew, Gallagher,

Silvia, Winterstein, Breen, Terhar, & Steger (2009, pp. 987–988), the original root of curiosity is found within the innate cognitive-emotional structure of an individual.

Self-determined inquiry learning is inextricably connected with the interest of the learners. Hence, this inquiry-related disposition is a criterion, typically for inquiry learning arrangements in the sense of TILA.

Method Affirmation

The criterion "method affirmation" characterizes the learners' approval of the individualized self-determined learning process. It represents an inevitable precondition of inquiry learning arrangements, because negative attitudes regarding the manner of learning would be contradictory to the tenet of authenticity and autonomy (Ryan & Deci 2004, p. 8).

Experience-based Hypothesizing

Hypothesizing and making assumptions based on personal experiences is part of inquiry learning and represent a fundamental inquiry-related action domain. These processes involve the accessing to implicit foreknowledge as well as the application of anticipatory intuition and integrate the inquiry experience into the personal learning continuum (Hogrebe 1996; cit. in Neuweg 2004, pp. 208–210; Roth 2009, p. 60).

Authentic Exploration

The discovery of suitable exploratory paths within inquiry learning arrangements is marked by autonomy, authenticity and collaboration (Reeve 2004). Authentic exploration implies that the process is controlled by the learner and supported by collaboration with other learners or demanded instruction by coaches or teachers.

Critical Discourse

Critical discourses within inquiry learning arrangements conduce to several beneficial outcomes as (a) convergence, (b) construction of meanings, (c) negotiation of claims of validity, (d) consensus, or (e) collaborative creation of perspectives (Ruf & Goetz 2005, p. 73; Reich 2010, p. 29, 2008, p. 161). Within a critical discourse, the participants discuss not just the results but also their performance as well as developed personal meaningful contexts. (Reich 2010, pp. 60–63).

Conclusion-based Transfer

The transfer of constructed insights and perceptions characterizes another inquiry-related action domain. The evolvement of this criterion is driven by one´s need of competence (Ryan & Deci 2004, p. 7; Elliot, McGregor, & Thrash 2004, p. 361) and emerges in the form of disseminations or applications of the created knowledge or products. The conclusion-based transfer seems to be a logical and meaningful element of authentic inquiry processes (Dewey 1933).

A conflation of the theoretical considerations and the presented criteria, which can be interpreted as indicators of inquiry learning, leads the author to the following definition of inquiry learning…

> "…as a process of self-determined quests for discovering contexts of knowledge and insights that are new for the inquiring learner. Thereby, inquiry learning evolves into both an autonomous and

structured process at the same time. This process reaches from a sensory tangible discovery via a systematic exploration through to a methodological procedure typical of scientific activity. Inquiry learning is underpinned by two inquiry-related dispositions: (a) general discovery interest, and (b) method affirmation. Further, four inquiry-related action domains are characteristic for self-determined inquiry learning. These domains are (c) experience-based hypothesizing, (d) authentic exploration, (e) critical discourse, and (f) conclusion-based transfer. Inquiry learning arrangements, therefore, are educational settings characterized by collaborative endeavors of inquiry learning. Within inquiry learning arrangements, the previously mentioned six criteria (a-f) unfold." (Reitinger, Haberfellner, & Keplinger 2015, p. 3; cf. Reitinger 2013, p. 45)

Within TILA, learning settings are described as arrangements. According to Merriam-Webster Dictionary (2015) the term arrangement means "…the way that things or people are organized for a particular purpose or activity; the way that things or people are arranged; something that is done to prepare or plan for something in the future; a usually informal agreement." As within a setting of self-determined inquiry learning according to TILA (a) the collaborate organization of activities as well as (b) informal agreements concerning something in the future are indeed part of the endeavor, the term arrangement seems to be appropriate.

The Criteria of Inquiry Learning Inventory (CILI)

Within the Criteria of Inquiry Learning Inventory (CILI) The focus is put on the following action domains that are related to inquiry: "experience-based hypothesizing" (exhy), "authentic exploration" (auex), "critical discourse" (crdi), and "conclusion-based transfer" (cotr). The primary reasons for such a focus are the following:

- The criteria "discovery interest" and "method affirmation" indicate inquiry-related dispositions of the learners. They do not point at the performance of an action of inquiry learning. The endeavor of the treatise in hand, however, concentrates especially on obtaining transparency concerning action domains, not on individual dispositions.
- Dispositions, such as interest, curiosity, or appreciation of performed activities or methods have already been content of several scale development activities. Thus, standardized inventories already exist, e.g. the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen 1989), the Curiosity and Exploration Inventory-II (CEI-II; Kashdan, Matthew, Gallagher, Silvia, Winterstein, Breen, Terhar, & Steger 2009), the Situational Motivation Scale (SIMS; Guay, Vallerand, & Blanchard, 2000), or the Acceptance and Action Questionnaire-II (AAQ-II; Bond, Hayes, Baer, Carpenter, Guenole, Orcutt, Waltz, & Zettle 2011).
- Not least, the focus on four partial constructs instead of six brings about a simplification of the process of inventory development.

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