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Intellectual Output 09:

PERFORMANCE INDICATOR SET¹ IV FOR LEARNING AND TEACHING (IN HIGHER EDUCATION)

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¹ Changed from "Core Dataset" in the SQELT application to "Performance Indicator Set".

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Some Explanatory Notes on the SQELT Performance Indicator Set

'Good teachers know that no regulation, no quality mechanism, no technology, can guarantee effective student learning. Similarly, effective staff development must be founded on a view of education and educational leadership as empowerment through engaging in a shared vision. It is about increasing consciousness; it is a moral practice. Like good teaching, it does not know "the answers" to what will help lecturers to develop their understanding. It is a continuing search for better ways of achieving excellence in teaching through the imaginative acquisition of knowledge; and in that is its exhilaration and its professional justification' (Ramsden, 1993, p. 96).

About the Indispensability and Pragmatic Understanding of Performance Indicators

Underlying the present piece of work is the following pragmatic understanding of performance indicators (PIs):

Performance indicators 'represent qualitative and quantitative information and data, which indicate functional qualities ("performance") of institutional, organisational or individual performance providers.' Thus, 'PIs provide information about the degree to which quality performance objectives are being met' (Leiber, 2019, p. 77).

Ideally, as the name says, a performance indicator gives an indication of some performance (or performance pre-condition) of an individual or an organisation, for example, in the context or framework of a project, programme, product or other initiative. Typically, a performance indicator is related to points of reference such as standards and goals against which the measured value of the indicator and thus the achieved degree of performance or success is assessed.

Depending on the complexity of the activity, project, programme or organisation under scrutiny, the performances to be looked at can be very different and therefore PIs can cover a wide range of measures of different complexity: from pure performance figures (numerical values; quantitative PIs)² to complex qualitative performance information, which is based on the measurement and collection of qualitative information (qualitative PIs).³ Usually, by convention a PI only refers to past performances the measurement being descriptive or lagging, while an 'indicator' of future performance may be called a prognosticator that cannot be mainly based only on factual achievements.

Performance data management models based on PIs represent one specific modelling perspective which seems to be indispensable for any systematic approach to quality assurance (QA) and quality development in HEIs because

- 'PIs reflect the quality goals ("targeted performance") of institutions, institutional units and programmes; and without setting such goals it seems impossible to systematically improve quality' (Leiber, 2019, p. 77);
- 'PIs open the way to objectify communication and operationalisation of quality relevant features and, in the case of quantitative PIs, measure them' (Leiber, 2019, p. 77);
- PIs can be used in various performance models in HEIs such as quality audit, accreditation and performance reporting. In this way, PIs can be used by HEIs to provide information for internal QA (e.g., monitor performance for comparative purposes; facilitate assessment of institutional operations), external QA (such as accreditations, audits, evaluations) and accountability needs and reporting purposes (e.g., to the government, HEI council, broader public) and rankings/ratings.

It should be recognised, however, that PIs will usually only 'depict trends and uncover interesting questions', but 'they do not objectively provide explanations which reflect the complexity of higher education or permit conclusions to be drawn' (Chalmers, 2008, p. 17). Instead, 'multiple sources of both quantitative and

² An example of such a quantitative performance indicator is: Number of student workplaces held in a university's facilities in relation to the student population of the university and/or per subject field and/or per study programme.

³ An example of such a qualitative performance indicator is: Students' learning gain in reflective competences (according to relevant quality criteria to be identified, e.g. systemic thinking, forward thinking, critical thinking, self-perception competence) that could be assessed by (satisfaction) surveys of students, surveys of teaching staff and assessment reports by experts/peers (other than students and teaching staff) including the lawful protection of the use of students' personalised data for Learning Analytics.

qualitative information' are needed and it is 'imperative that indicators should only be interpreted in light of contextual information concerning institutional operation and with the assumption and purpose for which the information is being used made explicit' (ibid.).

Suggesting a comprehensive⁴ set of qualitative and quantitative PIs does neither imply that QA (comprising quality development) is reduced to a tick box-like checking of pre-determined fixed features, nor does it mean that monitoring and checking PIs would necessarily completely exploit the QA process. Particularly, PIs are necessarily vague and fuzzy to a certain degree, in the sense that they cannot be completely precise with respect to conceptualisation and operationalisation, and applicable to different HEIs at the same time. In other words, PIs must be interpreted and operationalised; both procedures can be usually carried out in a variety of ways depending on various possible adjustments to the context.

Even more than that, in general any list of PIs will be fallible in several ways: First, there is always the possibility that elements of the set are empirically inadequate. Second, there is always a tendency that modelling is under-complex in a too much pronounced way as compared to the modelled entities and their dynamics. Third, PI model sets will usually be systematically incomplete like any list of normative statements because we cannot foresee all the individual cases.

About the Quality of Performance Indicators

Following Denise Chalmers, the measurement, monitoring and evaluation of L&T quality in HEIs should involve PIs

'which are significant in informing individual and institutional performance; and where feasible, also significant on a common national or sector-wide level. A useful PI is one that informs the development of strategic decision-making, resulting in measurable improvements to desired educational outcomes following implementation' (Chalmers, 2008, p. 17).⁵

In other words, as a rule, PIs, if adequately applied, are core elements of (summative or formative) quality evaluation procedures. Therefore, the principles or methodological standards of evaluation can be applied to characterize proper PIs, i.e. their "fitness for purpose": PIs must be useful, appropriate, fair and precise (DeGEval, 2016):

- Usefulness

PIs should be useful, i.e. it should inform the user in a way that can improve decisions. To be useful, the different goals of PIs, i.e. the information and knowledge requirements of the users, must be clarified in advance. In addition, usefulness also depends on the competences and credibility of those using PIs in assessments and evaluations.

- Appropriateness

The procedures for obtaining data and information for PIs should be appropriate. As a rule, instead of being used in isolation PIs must be used as a group thus grasping the multi-facetedness and interconnectedness of performance issues.

The understanding of PIs should be holistic, i.e. PIs should provide data and information concerning the L&T environment, teaching competences and processes, learning competences and processes, as well as learning outcomes and learning gains including their assessment.

- Fairness

The collection of data and information for PIs should be planned and carried out in a way that protects the rights, safety and dignity of the persons involved.

- Precision

⁴ 'Comprehensiveness' also implies 'significance on a common sector wide scale'.

⁵ Some may object that this is a very high requirement for PIs and therefore drastically limit the number of possible PIs. On the other hand, it should be borne in mind that every contribution, possibly very small, to strategic decisions including improvement potential must be taken into account. Particularly, "strategies" are not solely "big strategies" but comprise also smaller ones as for example the strategy to improve the relevant library offers of a specific requested literature.

Survey methods and data sources should be selected in such a way that the reliability of the data obtained and its validity in relation to answering the performance measurement questions are ensured according to professional standards. The technical standards should be based on the quality criteria of empirical research. The sources of information and data used for PIs should be documented with adequate accuracy to assess the reliability and appropriateness of the information and data.

About a More Integrative Approach to Learning and Teaching

It can be argued that an integrative approach to L&T is required which takes seriously the competence and learning outcomes orientation, while, at the same time, does not overlook other L&T domains. Such an approach may be based on the following distinction of four L&T subdomains that pragmatically differentiate the area of L&T into four (interlocking) sub-areas in order to facilitate the analytical compilation and presentation of the comprehensive PI set:

- Teaching competences and processes
This sub-area of L&T focuses on capturing the teaching processes, i.e. teachers' competences and actions (which are, of course, related to learning processes).
- Learning competences and processes
This sub-area of L&T focuses on capturing the learning competences and actions of students (which are, of course, related to teaching processes).
- Learning outcomes and learning gain and their assessment
This sub-area of L&T focuses on the outcomes and impact of L&T that are realised by the students including the assessment processes for measuring these outcomes. The differentiation of this sub-area is justified by the following three aspects: the sub-area addresses the main objective of L&T, it has recently become the focus of quality assessment and it is particularly difficult to grasp.
- L&T environment
This sub-area of L&T comprises the framework conditions and inputs to L&T in institutional and organisational matters, staff and students etc.

These four constitutive domains should be taken into consideration to generate a comprehensive view on L&T quality issues, because L&T quality of (higher) education is multi-causally determined by the quality of inputs (teaching; learning; L&T environment) and characterised by the quality of outcomes (learning outcomes/gain and their assessment). As already mentioned, these four domains (and their PIs, see Tables 1-4 below) are usually not strictly separable from each other and should therefore always be considered together.

'With regard to content, the proposed holistic approach can be characterised by the following entangled features that set the enabling conditions for optimised L&T processes and are also displayed by the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) (ENQA, 2015). The first associated task is to optimise L&T environment (ENQA, 2015, Standard 1.6), while the second task consists in implementing the 'shift from teaching to learning', which provides more active roles for learners and participatory approaches. This second task comprises: (1) a student-centred approach, whereby students and their learning processes are adequately considered as the core targets of improving quality in L&T (ENQA, 2015, Standard 1.3); (2) changed roles for teachers (ENQA, 2015, Standard 1.5), who improve their teaching competences to de-emphasise the traditional focus on instructing passive students and give stronger emphasis to the proper arrangement of learning environments and design of learning situations and learning advice; (3) the constructive alignment of L&T to learning objectives and outcomes and their effective assessment (ENQA, 2015, Standard 1.2), which also includes some alignment of academia (for example, objectives of academic and artistic qualifications) to society (for example, objectives of employability, citizenship and personality development); (4) the promotion of self-organised and active learning (for example, problem-based learning; research-oriented learning; lifelong learning);

(5) the conjunction of knowledge acquisition and acquisition of learning strategies; (6) the consideration of motivational, volitional and social aspects of learning' (Leiber, 2019, p. 79).

A Comprehensive Set of Performance Indicators for Learning and Teaching: General Remarks and Working Definitions

The tentatively comprehensive⁶ set of more than 800⁷ explicitly listed PIs for L&T, which is presented below in Tables 1-4, resulted and emerged from critical reflection of research literature and related sources, the most influential of which are the following: (Accreditation Council, 2013; Åkerlind, 2004; Bocconi et al., 2012; Chalmers, 2008; CHE 2018; IUUSE, 2018; Keshavarz, 2011; Krämer & Müller-Naevecke, 2014; Lodge & Bonsanquet, 2014; OECD-AHELO, 2013, pp. 41 ff., 54 ff; Ramsden, 1991; CHE, 2018; Whiteley, 2016; Yarkova & Cherp, 2013; Yorke, 1991; Yorke, 1998; Zlatkin-Troitschanskaia et al., 2016). Other sources are explorative surveys, interviews and focus group discussions with stakeholders (students; teachers; quality managers; leadership) of the six SQELT partner universities – University of Aveiro, Portugal; Birmingham City University, United Kingdom; Ghent University, Belgium; Jagiellonian University Kraków, Poland; Danube University Krems, Austria; University of Milan, Italy – (SQELT, 2018) and eight German public universities from the federal state of Baden-Wuerttemberg in the context of an INQAHE Research Project (QUELIT, 2016). Underlying the approach and identification of PIs for L&T is a general theory of L&T which motivates and justifies at least some of the PIs.⁸

Accordingly, the study took an iterative approach, in the sense that the results of main project development steps continuously informed the following project steps, analyses and syntheses. Methodologically, a qualitative and conceptual hierarchy-based analysis of textual (and linguistic) descriptions of performance areas and especially performance indicators at HEIs was used. The textual and linguistic descriptions came from scholarly literature, focus group discussions with project-external HEIs' members and discussions among project members. Establishing the final comprehensive PI set (SQELT Intellectual Output O9) required a number of iterations (exemplified by SQELT Intellectual Outputs O4, O5 and O6) all of which either aimed at increasing relevance and accuracy of the PIs, or had a specific thematic focus (e.g. incorporating certain performance areas and types; including Learning Analytics; considering data ethics; reflecting dimensions of sustainability education).

The mentioned comprehensiveness of the proposed PI set deserves some explanatory comments:

- “Comprehensiveness” is not meant to denote “perfection” or “actual completeness” or similar.⁹
- Rather, the completeness of the PI set refers to the signature that the list of PIs is presented as a set which is non-exhaustive and can always be expanded and made more precise. Furthermore, it should be acknowledged that PIs also require a continuous further development, addressing something like an “evolution of PIs”.
- Among other things, this includes that any users of the proposed PI set, such as HEIs, have to creatively deal with the set, in view of the potential fallibilities, complexity and institutional profile-driven preferences and potentially further framework conditions.
- It is important to understand that the proposed “comprehensive PI set” is definitely not a PI set suggested for all HEIs or suggested to be fully adopted by any particular HEI whatsoever. Rather, the proposed comprehensive PI set is meant to represent a broad and wide range of PIs from which any particular, real HEI normally will have to and actually will choose a subset relevant to its needs such as its profile, current foci, core development areas, technical challenges, capacity issues, challenges of strategic maturity, governmental expectations, etc.

⁶ To be quite clear, “comprehensive” is not synonymous to “complete”, “finished” or “perfect”.

⁷ There is generally a certain degree of flexibility with regard to the exact specification of this number, which stems from the fact that the concrete description of a performance indicator includes pragmatic decisions about how detailed or “deep” a performance process and its results can be or shall be analysed and then described as such. This interpretational depth of differentiation is differently pronounced for different PIs. For example, there is hardly any room for interpretation for the PI “Number of books per book title held in library per student population of subject fields and/or per study programmes” (see Table 4); while there is a great deal of room for interpretation for the PI “Students’ learning gain in social competences (according to relevant quality criteria to be identified, e.g. team, communication and leadership competences; empathy; ability to cooperate; ability to solve conflicts) that could be assessed by (satisfaction) surveys of students, surveys of teaching staff and assessment reports by experts/peers (other than students and teaching staff) including the lawful protection of the use of students’ personalised data for Learning Analytics” (see Table 3).

⁸ First steps of a corresponding analysis were developed in (Leiber, 2019), which will be followed up in near future.

⁹ This semantic understanding of the term “comprehensive” is in accordance, for example, with the Oxford Advanced Dictionary.

Further, the following explicative points may be made to the PIs listed in Tables 1-4 below and their interpretation:

- These PIs are either qualitative or quantitative in nature; particularly, there is no epistemological and methodological reduction to exclusively quantitative PIs.
- The PIs are in accordance with the ESG (ENQA, 2015), i.e. at least broadly, the ESG's quality assurance areas and commitments are accounted for.¹⁰
- Many of the suggested PIs may be further analysed, while some of them may also require deeper analysis and operational interpretations such as spelling out in more detail the related assessment procedures, evaluation criteria¹¹ and exact ways of calculating (or "building") the PIs. Another aspect is to look more deeply into pedagogical characteristics and technological options of relevant learning processes.
- There is also a continuing general need for (further) checks of appropriateness and feasibility as well as (further) 'consultation with the sector in the development or review of the performance models and the performance indicators that they employ, if there is to be widespread acceptance of the performance indicators eventually identified' (Chalmers, 2008, p. 33).

At the same time, however, the hope of a conclusive clarifying consensus with the sector (sub-sectors) should not be expressed too positively, because the empirical corroboration and justification of PIs for complex multiple-hybrid social organisations such as HEIs is a rather challenging task. To give a real-life example: when HEI representatives are surveyed, which PIs they see as more important or less important, and whether PIs are applied in their institution – regularly, occasionally, or not at all –, interviews, focus group discussions and other approaches show that, in general, it is not easy for HEI members to answer these questions because the relevance of certain PIs varies with subject fields (disciplines or sub-disciplines), institutional levels, profiles and development goals, and it is often difficult to have an overview over the corresponding QA activities, monitoring and performance measurements throughout the whole institution (i.e., the different faculties, departments etc.). Therefore, it must be accepted that, by tendency, answers can be vague and fuzzy to some (probably often undetectable) extent.

PIs, particularly qualitative PIs, can be used to monitor performance and performance capacity and aspects of these for comparative purposes, to facilitate the assessment of institutional operations, and to provide evidence for quality assurance and improvement. Particularly, more complex PIs to a greater extent rely on points of reference (e.g. objectives, assessments, comparators). Accordingly, such PIs are generated by more complex procedures and related measures (e.g. structured surveys and interviews, focus group discussions, expert assessments) and intended to provide a complexity-adequate indication of a state or process.

It should be noted that a clearer and more condensed and, at the same time, widely agreed definition of the term "performance indicator" (in higher education L&T) is currently not available. However, this is not extremely bad, because definitions are not empirically true or false, or more reliable or less reliable, but merely fulfil pragmatic functions of conceptual clarity and for facilitating communication.

Learning Analytics and Performance Indicators

In the context of quality issues – quality assurance and development – of L&T, the theme of Learning Analytics quite naturally occurs because it is concerned with using analytical data of learning processes to contribute to the improvement of learning processes, learning outcomes and learning gain ("value added"). According to a commonly used definition, the basis of Learning Analytics is

'the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimising learning and the environment in which it occurs' (Siemens, 2011a; HEC, 2016, p. 4).

¹⁰ For some readers, it may seem worthwhile to check for this accordance in more detail.

¹¹ For example, all complex PIs represented by "student satisfaction surveys about ..." and "teaching staff satisfaction surveys about ..." require specifications of the criteria to be surveyed, i.e. the items that are intended to be measured and monitored.

In a slightly more comprehensive way, the definition of Learning Analytics explicitly refers to the use and dissemination of the respective learners' data. Accordingly, Learning Analytics can be defined as the

'collection, analysis, use, and appropriate dissemination of HEI-generated, actionable data with the purpose of creating appropriate cognitive, administrative, and effective support for learners' (Slade & Prinsloo, 2013, p. 1512).

Thus, Learning Analytics includes the methods of 'gathering information on how learners are interacting with learning resources, each other, and their teachers' (Lockyer et al., 2013, p. 1439). It captures learner-generated data 'on specific, observable behaviour [of learners] in real time' (Lockyer et al., 2013, p. 1440) and 'combines them with an analysis model to predict student progress and performance. The acquired information is used to adapt the e-learning [and learning] environment to support and improve individual learning' (Ledermüller & Fallmann, 2017, p. 81).

How then are PIs and Learning Analytics related to each other? Clearly, all PIs that are reliably related to or refer to learning processes, learning outcomes and learning gain can be relevant for Learning Analytics, i.e. the measurement and monitoring of learning processes, outcomes and gain as a basis for data-informed interventions to improve the students' learning. It is important to note that a core idea of Learning Analytics is to make recommendations for the individual student to improve their learning processes. To achieve this, personalised data are required. For example, the mathematics knowledge and skills identified during an online assessment of an individual student could be used to give online recommendations to this student to improve her/his mathematics knowledge and skills. Such personalised data are, as a rule, under specific protection by national data and privacy law and particularly by the GDPR (European Union General Data Protection Regulation; EUC 2016), or the SQELT Ethical Code of Practice for Data Management (ECPDM 2020).¹²

Against this backdrop, in the Performance Indicator Set IV (Tables 1-4) presented below, all PIs that could be relevant for Learning Analytics are marked by the acronym PDRLA which stands for "Personalised data required for Learning Analytics". For these PIs considered to be PDRLA, HEIs need to have a formal consent from their students for the collection, analysis and use of the data and information to develop measures targeted at individual students.

Used Abbreviations

ECTS – European Credit Transfer System

ESD – Education for Sustainable Development

FTE – Full-time equivalent

GDPR – General Data Protection Regulation

HEI(s) – Higher education institution(s)

HESD – Higher Education for Sustainable Development

ICT – Information and communication technology

LMS – Learning management system

L&T – Learning and teaching

MOOC – Massive Open Online Course

PDRLA – Personalised data required for Learning Analytics; such data are, as a rule, under specific protection by national data and privacy law and particularly by the GDPR (European Union General Data Protection Regulation)

PI(s) – Performance indicator(s)

¹² It might be added, that in specific situations the core idea of Learning Analytics mentioned above could be widened from generating L&T-related recommendations for individual students to generating group-specific recommendations. In cases where this is possible some of the privacy data protection regulations may not have to be or cannot be applied at all. The price for this procedural relief normally would be a lower level of achievable specificity and therefore effectiveness of the proposed recommendations for action.

QM – Quality management

SAS – Student admission system

SDG(s) – Sustainability Development Goal(s)

SDL – Self-Directed Learning

SIS – Student information system

SUSTEX – (satisfaction) surveys of students, surveys of teaching staff and assessment reports by experts/peers (other than students and teaching staff) [abbreviating acronym for three basic appropriate ways of performance data assessment]

SQELT Performance Indicator Set IV for L&T in Higher Education

General Comments

A few general comments on the comprehensive PI set IV as depicted in Tables 1-4 seem to be in order:

- Generally speaking, it should be noted that there is (almost) no single PI which is not open to interpretation, and often also to dispute. To give just a few examples: even counting the student population and the number of subject fields and study programmes of a HEI can be a complicated and in details contested task; a similar reasoning applies to counting teaching staff.
- Another source of possible dispute is given by the understanding of the authors of the below presented PI set that it is hard and often seems even impossible in practice to explicate every PI in all details that are required for its concrete application under specific circumstances. In other words, for certain PIs the user has to give a reasonable interpretation to the PI as formulated in the PI set below: For example, in the case of the PI “Satisfaction survey of students about quality of physical and virtual library services (according to relevant quality criteria)” one of the main tasks left to the user is to identify the relevant quality criteria of physical and virtual library services. Further examples of this type can be found in the PI list in Tables 1-4.
- The application of any of the PIs from the PI list in Tables 1-4 may require a certain amount of “interpretation” by the user (users), by this perhaps producing a certain variability (variation) in (and for) practical use.
- Of course, any user of the present PI set (including involved stakeholders from the SQELT partnership HEIs) can use or edit or omit any of the PIs to fit their specific needs and contexts according to considerations relating to the PI’s relevance, applicability and feasibility. Such concerns may be related to the HEI’s profile, specific legal restrictions of the HEI, the quality assurance and QM utilised at the HEI, the data ethics applied at the HEI and the knowledge and culture of dealing with PIs at the HEI etc.
- Many of the PIs listed below comprise and incorporate several options, which are indicated by formulations such as the following: “per HEI and/or per department/institute and/or per subject field and/or per study programme”. Of course, any user of the PI can make choices from these options according to their own considerations and preferences.
- The linguistic description of (qualitative) PIs stands in the field of tension between a very precise and detailed (and therefore more extensive) description on the one hand and a concise but therefore more abstract (or some may call it vague) description on the other hand. Often, how to find and keep the balance between these two extremes is not unambiguous or completely uncontested. Therefore, the authors of the PI set listed below do not claim that it is perfect in its entirety. Some of the PIs presented could benefit from linguistic fine-tuning and it will also be opportune and necessary for users of the set to (qualitatively) interpret the PIs suggested.
- PIs differ – as stated earlier in this report – in, for example, their level of preciseness, the level of “measurability” and level of “proximity” to the real-world performance processes. It is not easy (perhaps even impossible) to achieve a clear consensus that all PIs in the present list(s) (Tables 1-4) achieve the same level of descriptive accuracy.
- For the PI set presented in Tables 1-4 pragmatic comprehensiveness is claimed, but not factual completeness (for every possible application and/or user). That is why it is possible at any time for a user of the set to expand, supplement, modify, add or omit elements.
- It is legitimate to question which of the PIs in the following comprehensive PI set may be seen as ‘generic’ or ‘standard’ or ‘of sector-wide relevance’ in higher education L&T. In view of the large scope of the comprehensive PI set, and the complexity of many of its PIs, this question probably

has no simple answer valid for all HEIs. From the perspective of the SQELT project, it can be suggested that the comprehensive PI set may – in time – contribute to leading to a system or sector consensus on a generic or standard set.

PIs for Teaching Competences and Processes

In Table 1 the SQELT project's PIs that are mainly related to teaching competences and processes are listed, including their measures/performance measurement methods, if appropriate. To facilitate overview in a pragmatic way, the PIs of this area are ordered according to performance types and performance sub-types. This makes it also easier to check which performance types are covered by the listed PIs.

Table 1: Comprehensive set of PIs for L&T ("Performance Indicator Set IV"): performance area of teaching competences and processes

Performance types	Performance sub-types	PIs and their measures/performance measurement methods
Teaching staff workload		Official teaching commitment in average semester or trimester or year hours per week per subject field ¹³ and/or study programme
		Teaching staff workload (according to relevant quality criteria to be identified, e.g. number of teaching hours per semester week; number of courses) that could be assessed by satisfaction surveys ¹⁴ of relevant groups ¹⁵ of teaching staff (e.g. of a subject field, study programme)
Quality of teaching staff, teaching and teaching staff engagement	Teaching skills	Proportion of teaching staff who participated in pedagogical training (according to relevant quality criteria to be identified, e.g. didactics of Transformative and Holistic Continuing Self-Directed Learning (THCSDL) ¹⁶)
		Proportion of teaching staff who participated in support activities for their adaptation of technology-enhanced L&T (e.g. e-learning, flipped classroom) (according to relevant quality criteria to be identified)
		Proportion of teaching staff who participated in peer support systems for teaching staff (according to relevant quality criteria to be identified)
		Proportion of teaching staff who participated in teaching observation (according to relevant quality criteria to be identified)
	Teaching staff recruitment	Quality of teaching courses of recruitment candidates for teaching staff (according to relevant quality criteria to be identified, e.g. didactics of Transformative and Holistic Continuing Self-Directed Learning (THCSDL)) that could be assessed by (satisfaction) surveys of students and teaching staff
		Quality of recruitment procedures (according to relevant quality criteria to be identified, e.g. procedural responsibilities; recruitment and selection process; recruitment quality criteria) for lecturers/associate professors/full professors (according to relevant quality criteria to be identified, e.g. teaching skills, pedagogic skills, research activities) that could be assessed by (satisfaction) surveys of students ¹⁷ , surveys of teaching staff and assessment reports by experts/peers ¹⁸ (other than students and teaching staff) ¹⁹ (SUSTEX)
	Publications and presentations	Number and/or percentage of non-refereed publications during a specified period (e.g. three years) per FTE (full-time-equivalent) member of teaching staff and/or per subject field and/or per study programme
		Number and/or percentage of refereed publications during a specified period (e.g. three years) per FTE (full-time-equivalent) member of teaching staff and/or per subject field and/or per study programme
		Number and/or percentage of double-blind refereed publications during a specified period (e.g. three years) per FTE (full-time-equivalent) member of teaching staff and/or per subject field and/or per study programme
		Number and/or percentage of non-refereed presentations at academic conferences during a specified period (e.g. three years) per FTE (full-time-equivalent) member of teaching staff and/or per subject field and/or per study programme

¹³ Subject fields may be identified according to the classification in (UNESCO 2013) or any other appropriate classification.

¹⁴ In the following, the notion of survey generally comprises online and paper-and-pencil questionnaires with closed and open questions, (structured) interviews and focus group discussions; in other words, "survey" is not restricted or reduced to quantitative survey questionnaires.

¹⁵ The understanding that generally relevant groups should be selected for surveys and other data acquisition procedures applies wherever required throughout this PI set without being explicitly mentioned.

¹⁶ See e.g. (Du Troit-Brits 2018).

¹⁷ Comment: Some SQELT partners had/have concerns about the inclusion of students in the assessment of teaching staff recruitment. A counter argument is that, in general, students should not be excluded from participation when it comes to teaching staff recruitment. – Of course, such assessment must be organised adequately. For example, it is not to be expected that student beginners and students who are not engaged in HEI organisation could contribute fairly well to such assessment.

¹⁸ Here as well as at similar places throughout this PI set, it is due to the user of the PI in which form and context such assessment is carried out: for example, the assessment may be integrated part of an accreditation or it may be carried out as an individual evaluation of a study programme. Also, the user of the PI has the choice who exactly these "experts/peers" may be, if any, who may be involved in addition to, or in replacement of the before-mentioned stakeholders.

¹⁹ In the following and throughout this PI set, these three basic appropriate ways of assessment are abbreviated by the acronym SUSTEX.

		Number and/or percentage of refereed presentations at academic conferences during a specified period (e.g. three years) per FTE (full-time-equivalent) member of teaching staff and/or per subject field and/or per study programme
		Number and/or percentage of double-blind refereed presentations at academic conferences during a specified period (e.g. three years) per FTE (full-time-equivalent) member of teaching staff and/or per subject field and/or per study programme
	Teaching staff competences	Teaching staff's subject-matter competences (according to relevant quality criteria to be identified) that could be assessed by satisfaction surveys of students
		Teaching staff's methodological competences (according to relevant quality criteria to be identified) that could be assessed by satisfaction surveys of students
		Teaching staff's vocational training competences (according to relevant quality criteria to be identified) that could be assessed by satisfaction surveys of students
		Teaching staff's digital skills competences (according to relevant quality criteria to be identified) that could be assessed by satisfaction surveys of students
		Teaching staff's social competences (e.g. team, communication and leadership competences) (according to relevant quality criteria to be identified) that could be assessed by satisfaction surveys of students
		Teaching staff's respect and interest for students (according to relevant quality criteria to be identified) that could be assessed by satisfaction surveys of students
		Teaching staff's encouraging students' autonomous, critical thinking and acting (according to relevant quality criteria to be identified) that could be assessed by satisfaction surveys of students
		Teaching staff's didactics competences and pedagogical knowledge and skills (according to relevant quality criteria to be identified, e.g. didactics competences in Transformative and Holistic Continuing Self-Directed Learning (THCSDL) and knowledge of teaching models and learning processes) that could be assessed by satisfaction surveys of students
		Teaching staff's sensitivity to course level and progress (according to relevant quality criteria to be identified) that could be assessed by satisfaction surveys of students
		Teaching staff's fostering sustainability values (social, ecological, economical) (according to relevant quality criteria to be identified) that could be assessed by satisfaction surveys of students
		Teaching staff's feedback to students (e.g. on work in progress, test, completed assignments) (according to relevant quality criteria to be identified) that could be assessed by satisfaction surveys of students
		Teaching staff's expertise and competences in continuing education and life-long learning (according to relevant quality criteria to be identified) that could be assessed by satisfaction surveys of students
		Quality of teaching courses (according to relevant quality criteria to be identified, e.g. embedding of courses in curriculum, meaningful structures, options for participation, imparting knowledge and skills, preparation of teacher) that could be assessed by students' (satisfaction) surveys and/or teaching staff peer review and/or by participating observation of teaching staff
		Academic content and structure of courses offered
	Contemporaneity and timeliness of courses' content (according to relevant quality criteria to be identified) that could be assessed by SUSTEX	
	Methods of course delivery, and the quality and quantity of the demands made of students (according to relevant quality criteria to be identified) that could be assessed by SUSTEX	
	Compatibility of studies with working (according to relevant quality criteria to be identified) that could be assessed by SUSTEX	
	Cutting-edge teaching	Use of current research in informing teaching and curricula content (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
Organisation of course sessions	Organisation of course sessions/flexible learning (exemplary quality criteria include flexibility in the requirements, time and location of study, teaching, assessment and certification) that could be assessed by SUSTEX	
Special teaching staff competences in medicine	Quality of bedside teaching (e.g. concerning mentoring, suitability of rooms and variety of diagnostic techniques applied) (according to relevant quality criteria to be identified) that could be assessed by patient surveys and/or SUSTEX and/or peer review and participating observation by teaching staff and	
	Mutual integration of pre-clinical/theoretical and clinical/practical courses including experience with patient contact (according to relevant quality criteria to be identified) that could be assessed by SUSTEX	
	Quality skills labs and training centres (exemplary quality criteria include maintenance, accessibility, technical facilities, mentoring) that could be assessed by SUSTEX	
Overall quality of the student experience of teaching	Overall quality of study programmes, courses and students' experience of teaching (exemplary quality criteria include structure of study programme based on the contemporary state of knowledge and research; quality and relevance of course requirements; teaching	

		based on the contemporary state of knowledge and research; achievability of L&T goals that could be assessed by satisfaction surveys of students
Contact with work environment	Internships/practical experience/work experience	Number and/or percentage of study programmes (Bachelor, Master, doctoral/PhD) that have compulsory internships
		Number and/or percentage of compulsory internships per study programme (Bachelor, Master, doctoral/PhD)
		Number and/or percentage of hours connected to the internships per study programme (Bachelor, Master, doctoral/PhD)
		Number and/or percentage of ECTS credits connected to the internships per study programme (Bachelor, Master, doctoral/PhD)
		Number and/or percentage of phases of practical experience and/or work experience and/or external projects per study programme (Bachelor, Master, doctoral/PhD)
		Inclusion of internships in the study programme curricula (Bachelor, Master, doctoral/PhD) (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Inclusion of phases of practical experience and/or work experience and/or external projects in the study programme curricula (Bachelor, Master, doctoral/PhD) (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Inclusion of phases of practical experience and/or work experience and/or external projects in the study programme curricula (Bachelor, Master, doctoral/PhD) (according to relevant quality criteria to be identified) that could be assessed by SUSTEX

PIs for Learning Competences and Processes

In Table 2 the SQELT project's PIs that are mainly related to learning competences and processes are listed, including their measures/performance measurement methods, if appropriate. To facilitate overview in a pragmatic way, the PIs of this area are ordered according to performance types and performance sub-types. This makes it also easier to check which performance types are covered by the listed PIs.

Table 2: Comprehensive set of PIs for L&T ("Performance Indicator Set IV"): performance area of learning competences and processes

Performance types	Performance sub-types	PIs and their measures/performance measurement methods
Quality learning and student engagement	Student workload	Student workload (according to relevant quality criteria to be identified, e.g. number of learning hours per semester week, number of courses) that could be assessed by SUSTEX ²⁰ and/or by Learning Analytics methodologies ²¹ including, if required and lawfully protected (e.g. by the European General Data Protection Regulation (GDPR; EUC 2016) or the SQELT Ethical Code of Practice for Data Management (ECPDM 2020)), the students' personalised data that are relevant to make use of the PI for Learning Analytics ²² (PDRLA ²³)
	Student interactions with learning content	Average duration per student interaction with course activities (e.g. solution of exercises, watching videos, listening to lecture, participation in working groups, etc.) that could be assessed by reports generated from Learning Management Systems (LMSs) and/or Learning Analytics tools ²⁴ per student and/or per study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Average duration per student interaction with course contents that could be assessed by reports generated from LMSs and/or Learning Analytics tools per student and/or per study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number of repetitive visits to learning contents (e.g. during online learning) that could be assessed by reports generated from LMSs and/or Learning Analytics tools per student and/or per study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
	Student motivation	Students' dispositions, values and attitudes towards learning that could be assessed by SUSTEX through collection of learner data and pedagogical descriptors (exemplary quality criteria include learning-related emotions such as enjoyment, curiosity, frustration, or anxiety, and their interactions; students' ability in deactivating negative learning emotions, students' learning strategies) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
	Student learning competences	Students' competences with respect to learning and self-directed learning (SDL) (e.g. students' knowledge and understanding of learning theories, own learning processes, problem-based learning, research-based learning, internships, online learning, mobile learning, blended learning) (according to relevant quality criteria to be identified) that could be assessed by SUSTEX including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
	Overall quality of learning experience	Overall quality of student learning experience (according to relevant quality criteria to be identified) that could be assessed by student satisfaction surveys including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)

²⁰ Student surveys may be based on, e.g., self-assessment, learning diary, think-aloud protocols.

²¹ Exemplary quality criteria include visualisation of student activity for promotion of self-regulated learning processes via Student Activity Meter; providing insight into individual and group interactions with the learning content via LOCO-Analyst.

²² In the following and throughout this PI set, this clause about students' personal data protection is used in the abbreviated version: "including the lawful protection of the use of students' personalised data for Learning Analytics".

²³ PDRLA = Personalised data required for Learning Analytics.

²⁴ Such as BlackBoard, Moodle, Desire2Learn (e.g. individual user tracking, course-based); Social network analysis generated from Learning Analytics tools such as SNAPP (Social Networks Adapting Pedagogical Practice) (e.g. visualization of student relationships established through participation in LMS discussions); Individual and group monitoring generated from Learning Analytics tools such as GLASS (Gradient's Learning Analytics System) (e.g. visualization of student and group online event activity); Discourse analysis generated from Learning Analytics tools such as COHERE (e.g. visualization of social and conceptual networks and connections).

PIs for Learning Outcomes and Learning Gain and Their Assessment

In Table 3 the SQELT project's PIs that are mainly related to learning outcomes and learning gain and their assessment are listed, including their measures/performance measurement methods, if appropriate. To facilitate overview in a pragmatic way, the PIs of this area are ordered according to performance types and performance sub-types. This makes it also easier to check which performance types are covered by the listed PIs.

Table 3: Comprehensive set of PIs for L&T ("Performance Indicator Set IV"): performance area of learning outcomes and learning gain and their assessment

Performance types	Performance sub-types	PIs and their measures/performance measurement methods
Student success	Coursework performance	Personal student coursework grades and credit points earned including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Assessment/examination grades and credit points earned during the study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Percentage of credit points awarded in service-learning activities (e.g. students in community service activities and social work) in relation to total number of credit points including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
	Final examinations performance	Grades of students' final examinations of the study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of Bachelors' degrees awarded per year per HEI and/or per subject field and/or department/institute and/or study programme
		Number and/or percentage of Masters' degrees awarded per year per HEI and/or per subject field and/or department/institute and/or study programme
		Number and/or percentage of long first degrees awarded per year per HEI and/or per subject field and/or department/institute and/or study programme
		Number and/or percentage of doctoral/PhD (or equivalent) degrees awarded per year per HEI and/or per subject field and/or department/institute and/or study programme
		Number and/or percentage of doctoral/PhD (or equivalent) degrees awarded to international doctorate/PhD candidates per year per HEI and/or per subject field and/or department/institute and/or study programme
		Percentage of final examinations (Bachelor/Master/PhD) conducted face-to-face or online
	Completion of study units	Number and/or percentage of students who did not complete the programme modules they had started including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of students who did not complete the first year of study including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of students who did not complete the undergraduate programmes within the planned programme duration (Bachelor graduation on time) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of students who did not complete the undergraduate programmes (Bachelor graduation) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of students who did not complete the graduate programmes within the planned programme duration (Master graduation on time) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of students who did not complete the graduate programmes (Master graduation) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of students who did not complete their long first degree (= more than four years) within the planned programme duration (long first-degree graduation on time) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of students who did not complete their long first degree (= more than four years) (long first-degree graduation) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)

		Number and/or percentage of students who did not complete the doctoral/PhD (or equivalent) programmes within the planned programme duration (postgraduate graduation on time) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)	
		Number and/or percentage of students who did not complete the doctoral/PhD (or equivalent) programmes (postgraduate graduation) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)	
	Drop-out	Number and/or percentage of students who left their study programme per semester and/or per year per HEI and/or per subject field and/or per department/institute and/or per study programme	
		Number and/or percentage of students who intend to exit their study programme per year per HEI and/or per subject field and/or per department/institute and/or per study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)	
		Number and/or percentage of students who intend to exit their study programme to change to another HEI per year per HEI and/or per subject field and/or per department/institute and/or per study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)	
		Number and/or percentage of students who intend to exit their study programme to leave higher education per year per HEI and/or per subject field and/or per department/institute and/or per study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)	
	Prediction of student success	Student attrition (drop-out) predicted by educational data mining methodologies (according to relevant quality criteria to be identified) per year per HEI and/or per subject field and/or per department/institute and/or per study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)	
		Student performance (exemplary quality criteria include earned credit points; examination grades; learning gains; learning effectiveness; monitoring of students learning progress (stages)) predicted by educational data mining methodologies per year per HEI and/or per subject field and/or per department/institute and/or per study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)	
	Contact with work environment	Internships	Number and/or percentage of Bachelor students performing an internship per HEI and/or per subject field and/or department/institute and/or study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
			Number and/or percentage of Master students performing an internship per HEI and/or per subject field and/or department/institute and/or study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
External teachers		Number and/or percentage of Bachelor teaching practitioners per HEI and/or per subject field and/or department/institute and/or study programme who come from another HEI	
		Number and/or percentage of Bachelor teaching practitioners per HEI and/or per subject field and/or department/institute and/or study programme who are teaching at two or more HEIs	
		Number and/or percentage of Master teaching practitioners per HEI and/or per subject field and/or department/institute and/or study programme who come from another HEI	
		Number and/or percentage of Master teaching practitioners per HEI and/or per subject field and/or department/institute and/or study programme who are teaching at two or more HEI	
		Number and/or percentage of doctoral/PhD teaching practitioners per HEI and/or per subject field and/or department/institute and/or study programme who come from another HEI	
		Number and/or percentage of doctoral/PhD teaching practitioners per HEI and/or per subject field and/or department/institute and/or study programme who are teaching at two or more HEI	
Theses with external co-operation		Number and/or percentage of Bachelor theses produced in cooperation with industry/external organisations per HEI and/or per subject field and/or department/institute and/or study programme	
		Number and/or percentage of Master theses produced in cooperation with industry/external organisations per HEI and/or per subject field and/or department/institute and/or study programme	
		Number and/or percentage of doctoral/PhD theses produced in cooperation with industry/external organisations per HEI and/or per subject field and/or department/institute and/or study programme	
Employability		Employment situation after graduation	Number and/or percentage of Bachelor graduates per HEI and/or per subject field and/or department/institute and/or study programme who within a specified period after graduation (e.g. six months and/or one year) are unemployed
			Number and/or percentage of Bachelor graduates per HEI and/or per subject field and/or department/institute and/or study programme who within a specified period after graduation (e.g. six months and/or one year) are underemployed (e.g., working less than 35 hours per week)

		Number and/or percentage of Bachelor graduates per HEI and/or per subject field and/or department/institute and/or study programme who within a specified period after graduation (e.g. six months and/or one year) are full-time employed (e.g., working 35 hours per week or more)	
		Number and/or percentage of Bachelor graduates per HEI and/or per subject field and/or department/institute and/or study programme who within a specified period after graduation (e.g. six months and/or one year) are involuntarily employed in an occupation with a Qualification Frameworks level below the attained level	
		Number and/or percentage of Bachelor graduates per HEI and/or per subject field and/or department/institute and/or study programme who within a specified period after graduation (e.g. six months and/or one year) are enrolled in further study	
		Number and/or percentage of Master graduates per HEI and/or per subject field and/or department/institute and/or study programme who within a specified period after graduation (e.g. six months and/or one year) are unemployed	
		Number and/or percentage of Master graduates per HEI and/or per subject field and/or department/institute and/or study programme who within a specified period after graduation (e.g. six months and/or one year) are underemployed (e.g., working less than 35 hours per week)	
		Number and/or percentage of Master graduates per HEI and/or per subject field and/or department/institute and/or study programme who within a specified period after graduation (e.g. six months and/or one year) are full-time employed (e.g., working 35 hours per week or more)	
		Number and/or percentage of Master graduates per HEI and/or per subject field and/or department/institute and/or study programme who within a specified period after graduation (e.g. six months and/or one year) are involuntarily employed in an occupation with a Qualification Frameworks level below the attained level	
		Number and/or percentage of Master graduates per HEI and/or per subject field and/or department/institute and/or study programme who within a specified period after graduation (e.g. six months and/or one year) are enrolled in further study	
		Number and/or percentage of doctoral/PhD graduates per HEI and/or per subject field and/or department/institute and/or study programme who within a specified period after graduation (e.g. six months and/or one year) are unemployed	
		Number and/or percentage of doctoral/PhD graduates per HEI and/or per subject field and/or department/institute and/or study programme who within a specified period after graduation (e.g. six months and/or one year) are underemployed (e.g., working less than 35 hours per week)	
		Number and/or percentage of doctoral/PhD graduates per HEI and/or per subject field and/or department/institute and/or study programme who within a specified period after graduation (e.g. six months and/or one year) are full-time employed (e.g., working 35 hours per week or more)	
		Number and/or percentage of doctoral/PhD graduates per HEI and/or per subject field and/or department/institute and/or study programme who within a specified period after graduation (e.g. six months and/or one year) are involuntarily employed in an occupation with a Qualification Frameworks level below the attained level	
		Number and/or percentage of doctoral/PhD graduates per HEI and/or per subject field and/or department/institute and/or study programme who within a specified period after graduation (e.g. six months and/or one year) are enrolled in further study (e.g. post-doc, research fellow)	
		Number and/or percentage of Bachelor graduates per HEI and/or per subject field and/or department/institute and/or study programme who found their first job (after graduation) in the region where the HEI is located	
		Number and/or percentage of Master graduates per HEI and/or per subject field and/or department/institute and/or study programme who found their first job (after graduation) in the region where the HEI is located	
		Number and/or percentage of doctorate graduates per HEI and/or per subject field and/or department/institute and/or study programme who found their first job (after graduation) in the region where the HEI is located	
		Academic and career counselling for students	Quality of academic and career counselling (according to relevant quality criteria to be identified) that could be assessed by student satisfaction surveys
		Employer satisfaction with graduates	Job-related quality of graduates/entrants (exemplary quality criteria include graduates' preparation for the job, foundation skills, adaptive skills, teamwork and interpersonal skills, technical skills and domain specific knowledge, employability and enterprise skills) that could be assessed by employer satisfaction surveys
	Constructive alignment of	Learning outcomes	Appropriateness of intended learning outcomes (exemplary quality criteria include clear formulation and transparency of goals of study modules and courses, correlation of intended learning outcomes to contents of study programmes and courses) that could be assessed by SUSTEX

study programmes/ courses		Teaching staff awareness of existing intended learning outcomes (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Design and adjustment of teaching and assessments/examinations to defined intended learning outcomes (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
Student learning gain with respect to general (higher) education competences and personality development	Subject-matter competences	Students' examination and assessment results (e.g. final grades; assessments of individual exams and performances such as presentations, homework, workshops within study courses and study modules) with respect to subject-matter competences (according to relevant quality criteria to be identified) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Students' learning gain in subject-matter competences (according to relevant quality criteria to be identified, e.g. examination grades and received credit points, before-after comparison of knowledge and skills) that could be assessed by SUSTEX including the lawful protection of the use of students' personalised data (PDRLA)
	Methodological competences	Students' examination and assessment results (e.g. final grades; assessments of individual exams and performances such as presentations, homework, workshops within study courses and study modules) with respect to methodological competences (according to relevant quality criteria to be identified) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Students' learning gain in methodological competences (according to relevant quality criteria to be identified) that could be assessed by SUSTEX including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
	Reflective competences	Students' examination and assessment results with respect to reflective competences (according to relevant quality criteria to be identified, e.g. systemic thinking, forward thinking, critical thinking, self-perception competence) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Students' learning gain in reflective competences (according to relevant quality criteria to be identified, e.g. systemic thinking, forward thinking, critical thinking, self-perception competence) that could be assessed by SUSTEX including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
	Higher-order learning	Students' examination and assessment results with respect to higher-order learning competences (according to relevant quality criteria to be identified, e.g. skills involving analysis, planning/strategic thinking, evaluation/assessment/normative competences and synthesis (creation of new knowledge) according to Bloom's taxonomy ²⁵) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Students' learning gain in higher-order learning competences (according to relevant quality criteria to be identified, e.g. skills involving analysis, planning/strategic thinking, evaluation/assessment/normative competences and synthesis (creation of new knowledge) according to Bloom's taxonomy) that could be assessed by SUSTEX including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
	Action competences	Students' examination and assessment results with respect to action competences (according to relevant quality criteria to be identified, e.g. collaborative competences, integrative problem-solution competence) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Students' learning gain in action competences (according to relevant quality criteria to be identified, e.g. collaborative competences, integrative problem-solution competence) that could be assessed by SUSTEX including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
	Learning strategies and self-learning competences	Students' learning gain in learning strategies and self-learning competences (according to relevant quality criteria to be identified, e.g. knowledge of learning theories and practice; collaborative learning) that could be assessed by SUSTEX including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
	Quantitative reasoning	Students' examination and assessment results with respect to quantitative reasoning (according to relevant quality criteria to be identified, e.g. knowledge and skills in mathematical and statistical methodologies) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Students' learning gain in quantitative reasoning (according to relevant quality criteria to be identified) that could be assessed by SUSTEX including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
	Digital skills	Students' examination and assessment results with respect to digital skills (according to relevant quality criteria to be identified) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Students' learning gain in digital skills (according to relevant quality criteria to be identified) that could be assessed by SUSTEX including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)

²⁵ "Knowing" and "understanding" (or "comprehending") denote the two lowest levels of the five cognitive levels of Bloom's taxonomy: Knowledge; Comprehension; Application; Analysis; Synthesis, Evaluation (cf. Anderson et al., 2013).

	Interdisciplinary competences	Students' examination and assessment results with respect to interdisciplinary competences (according to relevant quality criteria to be identified, e.g. ability to combine and synthesize knowledge and methodologies from different disciplines) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)	
		Students' learning gain in interdisciplinary competences (according to relevant quality criteria to be identified) that could be assessed by SUSTEX including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)	
	Transdisciplinary competences	Students' examination and assessment results with respect to transdisciplinary competences (according to relevant quality criteria to be identified, e.g. competences to apply academic, discipline-related knowledge and skills outside academia) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)	
		Students' learning gain in transdisciplinary competences (according to relevant quality criteria to be identified) that could be assessed by SUSTEX including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)	
	Social competences	Students' examination and assessment results with respect to social competences (according to relevant quality criteria to be identified, e.g. team, communication and leadership competences; empathy; ability to cooperate; ability to solve conflicts) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)	
		Students' learning gain in social competences (according to relevant quality criteria to be identified, e.g. team, communication and leadership competences; empathy; ability to cooperate; ability to solve conflicts) that could be assessed by SUSTEX including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)	
	Self-competences	Students' examination and assessment results with respect to self-competences (according to relevant quality criteria to be identified, e.g. self-determination; capability of decision and learning; flexibility of action; ability to reflect; sovereignty) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)	
		Students' learning gain in self-competences (according to relevant quality criteria to be identified, e.g. self-determination; capability of decision and learning; flexibility of action; ability to reflect; sovereignty) that could be assessed by SUSTEX including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)	
	Student learning gain with respect to Higher Education for Sustainable Development (HESD) competences	Sustainability Development Goal 1 (SDG1)-related competences ('No Poverty')	Students' examination and assessment results with respect to SDG1 competences (see Appendix, Table 3a) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
			Students' learning gain in SDG1 competences (see Appendix, Table 3a) that could be assessed by SUSTEX and/or satisfaction surveys of employers including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		SDG2-related competences ('Zero Hunger')	Students' examination and assessment results with respect to SDG2 competences (see Appendix, Table 3a) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
			Students' learning gain in SDG2 competences (see Appendix, Table 3a) that could be assessed by SUSTEX and/or satisfaction surveys of employers including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
SDG3-related competences ('Good Health and Well-Being')		Ditto for SDG3	
SDG4-related competences ('Quality Education')		Ditto for SDG4	
SDG5-related competences ('Gender Equality')		Ditto for SDG5	
SDG6-related competences ('Clean Water and Sanitation')		Ditto for SDG6	
SDG7-related competences ('Affordable and Clean Energy')		Ditto for SDG7	
SDG8-related competences ('Decent Work and Economic Growth')		Ditto for SDG8	
SDG9-related competences ('Industry, Innovation and Infrastructure')	Ditto for SDG9		
SDG10-related competences ('Reduced Inequalities')	Ditto for SDG10		

	SDG11-related competences ('Sustainable Cities and Communities')	Ditto for SDG11
	SDG12-related competences ('Responsible Consumption and Production')	Ditto for SDG12
	SDG13-related competences ('Climate Action')	Ditto for SDG13
	SDG14-related competences ('Life below Water') competences	Ditto for SDG14
	SDG15 ('Life on Land')	Ditto for SDG15
	SDG16-related competences ('Peace, Justice and Strong Institutions')	Ditto for SDG16
	SDG17-related competences ('Partnerships for the Goals')	Ditto for SDG17
Assessment of learning outcomes	Structure and form of assessments	Percentage of examinations per subject field and/or per study programme which are systematically organised and structured according to pedagogical considerations that are derived from didactics models of empirical L&T research ²⁶
		Percentage of examinations per subject field and/or per study programme which are committed to formative assessment (i.e. formal and informal assessment procedures carried out by teachers during the learning process to modify L&T activities to continuously improve student attainment)
		Percentage of examinations per subject field and/or per study programme which use innovative forms of assessment (exemplary assessment forms include teacher assessment of students' completion of concept maps; multiple-choice concept tests; ePortfolios; podcasts; practical work processes; problem-solving processes)
		Quality of student assessment/examination procedures (according to relevant quality criteria to be identified, e.g. fairness, timeliness, adequacy of assessment format) that could be assessed by students (peer grading) and/or teaching staff peer review and/or teaching staff participating observation and/or teaching staff peer evaluation of assessment/examination protocols
		Percentage of examinations per subject field and/or per study programme which are conducted face-to-face or online
Study experience satisfaction		Quality of study experience during the student life cycle (according to relevant quality criteria to be identified) that could be assessed by satisfaction survey of freshmen and/or undergraduates and/or graduates and/or postgraduates and/or alumni including the lawful protection of the use of students'/alumni's personalised data for Learning Analytics (PDRLA)

²⁶ Comment: (1) The core function of this PI is to contribute to improving the practice of the assessment of learning outcomes which is an important issue in contemporary L&T. (2) It is a delicate PI, for example, because some teachers will think that it affects and possibly restricts academic freedom of teaching. (3) Some SQELT partners have doubts how the information and data required for this PI could be collected and provided. This can be done, for example, by ex-post evaluations of the structure, frameworks, forms etc. of examinations; and by organising continuing education for teachers about the issue including the feedback from ex-post evaluations.

PIs for L&T Environment

In Table 4, the SQELT project's PIs that are mainly related to L&T environment are listed, including their measures/performance measurement methods, if appropriate. To facilitate overview in a pragmatic way, the PIs of this area are ordered according to performance types and performance sub-types. This makes it easier to check which performance types are covered by the listed PIs.

Table 4: Comprehensive set of PIs for L&T ("Performance Indicator Set IV"): performance area of L&T environment

Performance types	Performance sub-types	PIs and their measures/performance measurement methods
Learning resources	Physical and virtual library and student workplaces	Number of books per book title held in library per student population of subject fields and/or per study programmes
		Number of periodical print subscriptions per subscription title held in library per student population of subject fields and/or per study programmes
		Number of periodical online subscriptions per subscription title held in library per student population of subject fields and/or per study programmes
		Number and/or percentage of open-access sources (journals, databases, other materials ...) available through the HEI's online portals/platforms per study programmes
		Quality and coverage of books and/or periodical print subscriptions and/or periodical online subscriptions and/or open access sources (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Number of student workplaces held in the HEI's facilities in relation to the student population of the HEI and/or per subject field and/or per study programme
		Average processing time of library orders (e.g. information requests, ordering of media, purchase suggestions, inter-library loans)
		Quality of physical and virtual library services (according to relevant quality criteria to be identified, e.g. barrier free access to library services and (re)sources from outside using VPN (Virtual Private Network)) that could be assessed by SUSTEX
	Diversity of courses offered	Diversity of courses that should, in principle, enable students to achieve the defined study and learning goals (according to relevant quality criteria to be identified, e.g. sub-indicators of the appropriateness of courses to be used are course topics ²⁷ , course types, course event time, course requirement levels, ...)
	Organisation of study programmes	Quality of the organisation of study programmes and course design (according to relevant quality criteria to be identified, e.g. transparency of entrance requirements/admission regulations; access to courses; average course size; completeness of courses offered compared to the study guide; can the courses be completed in the allotted time?; transparency of the examination system; opportunity offers for studying abroad; possibility of inclusion of study periods abroad; ...) that could be assessed by SUSTEX
		Quality of the organisation of continuing education study programmes and course design (according to relevant quality criteria to be identified, e.g. taking into account the needs of working students) that could be assessed by SUSTEX
		Inclusion in continuing education of students of different ages (according to relevant quality criteria to be identified ²⁸) is being envisioned, expected and realised) that could be assessed by SUSTEX
	Provision of creative and innovative L&T offers	Activity learning offers (e.g. problem-based learning; research-based learning; internships) (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Training offers to reflect upon learning approaches (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Provision of training in study skills and self-directed learning (SDL)/self-directed learning (SDL) techniques (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Organisation of peer learning activities (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Mobile learning offers (learning across multiple contexts, through social and content interactions, using personal electronic devices) (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Massive Open Online Courses (MOOCs) offers (according to relevant quality criteria to be identified) that could be assessed by SUSTEX

²⁷ To represent the entire subject field.

²⁸ For example, vision, and implementation criteria and guidelines of study programmes are making it clear and feasible that not only students of a specific age cohort (e.g., age 20-30) are being addressed, but rather an inclusion of all different types of students (for example, based on age).

	Provision of electronic and blended L&T	Number and/or percentage of blended learning courses per subject fields and/or per study programmes
		Number and/or percentage of online learning courses per subject fields and/or per study programmes
		Number and/or percentage of blended learning degree programmes per subject fields
		Number and/or percentage of online learning degree programmes per subject fields
		Number and/or percentage of MOOCs per subject fields and/or per study programmes
		Number and/or percentage of joint online learning courses offered with other HEIs
		Number and/or percentage of joint online learning programmes offered with other HEIs
Physical and digital structures	ICT structures	Number of accessible computers per student population of subject fields and/or per study programmes
		Accessible internet bandwidth per student user per subject fields and/or per study programmes
		Quality of ICT equipment (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
	L&T spaces	Quality of ICT services (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Quality of physical and virtual L&T spaces (e.g. lecture halls, seminar rooms, innovative L&T spaces) (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Quality of laboratory facilities (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
Teaching resources	Teaching staff	Number of teaching staff in FTEs (full-time equivalents) per HEI and/or per department/institute and/or per subject field and/or per study programme
		Number of teaching hours per HEI and/or per department/institute and/or per subject field and/or per study programme
		Ratio of teaching staff number in FTEs to student number per HEI and/or per department/institute and/or per subject field and/or per study programme
		Ratio of teaching staff average time in teaching to time in research, administration, consulting and community activities per HEI and/or per department/institute and/or per subject field and/or per study programme
		Gender ratio of all teaching staff per HEI and/or per department/institute and/or per subject field and/or per study programme
		Proportion of teaching staff with foreign citizenship (international teaching staff) per HEI and/or per department/institute and/or per subject field and/or per study programme
		Average salary of teaching staff in relation to average salary of reasonably comparable qualification level staff working in the same country but in other sectors
		Proportion of teaching staff with verified doctoral/PhD qualifications (or equivalent) per HEI and/or per department/institute and/or per subject field and/or per study programme
		Proportion of teaching staff with verified teaching qualifications (e.g. certificates) per HEI and/or per department/institute and/or per subject field and/or per study programme
		Proportion of teaching staff participating in professional development activities per HEI and/or per department/institute and/or per subject field and/or per study programme
		Proportion of teaching staff available to teach outside conventional teaching times (e.g. in the evening or on the weekends, to make it possible for students who are working to participate)
		Bachelor, Master and doctoral/PhD programmes
	Number of Master programmes per HEI and/or per department/institute and/or per subject field and/or per interdisciplinary field (e.g. multi-/interdisciplinary programmes)	
	Number of doctoral/PhD programmes per HEI and/or per department/institute and/or per subject field and/or per interdisciplinary field (e.g. multi-/interdisciplinary programmes)	
	Number of part-time Bachelor programmes per HEI and/or per department/institute and/or per subject field and/or per interdisciplinary field (e.g. multi-/interdisciplinary programmes)	
	Number of part-time Master programmes per HEI and/or per department/institute and/or per subject field and/or per interdisciplinary field (e.g. multi-/interdisciplinary programmes)	
	Number of part-time doctoral/PhD programmes per HEI and/or per department/institute and/or per subject field and/or per interdisciplinary field (e.g. multi-/interdisciplinary programmes)	
	Number of Bachelor programmes per HEI and/or per department/institute and/or per subject field that are offered in English and/or in another foreign language	
	Number of Master programmes per HEI and/or per department/institute and/or per subject field that are offered in English and/or in another foreign language	
		Number of part-time Bachelor programmes per HEI and/or per department/institute and/or per subject field that are offered in English and/or in another foreign language

		Number of part-time Master programmes per HEI and/or per department/institute and/or per subject field that are offered in English and/or in another foreign language	
		Number of part-time doctoral/PhD programmes per HEI and/or per department/institute and/or per subject field that are offered in English and/or in another foreign language	
		Number of Bachelor programmes per HEI and/or per department/institute and/or per subject field that offer some courses in English and/or in another foreign language	
		Number of Master programmes per HEI and/or per department/institute and/or per subject field that offer some courses in English and/or in another foreign language	
		Number of doctoral/PhD programmes per HEI and/or per department/institute and/or per subject field that offer some courses in English and/or in another foreign language	
		Number of part-time Bachelor programmes per HEI and/or per department/institute and/or per subject field that offer some courses in English and/or in another foreign language	
		Number of part-time Master programmes per HEI and/or per department/institute and/or per subject field that offer some courses in English and/or in another foreign language	
		Number of part-time doctoral/PhD programmes per HEI and/or per department/institute and/or per subject field that offer some courses in English and/or in another foreign language	
		Number of Bachelor programmes per HEI and/or per department/institute and/or per subject field that offer transdisciplinary contents	
		Number of Master programmes per HEI and/or per department/institute and/or per subject field that offer transdisciplinary contents	
		Number of doctoral/PhD programmes per HEI and/or per department/institute and/or per subject field that offer transdisciplinary contents	
		Number of part-time Bachelor programmes per HEI and/or per department/institute and/or per subject field that offer transdisciplinary contents	
		Number of part-time Master programmes per HEI and/or per department/institute and/or per subject field that offer transdisciplinary contents	
		Number of part-time doctoral/PhD programmes per HEI and/or per department/institute and/or per subject field that offer transdisciplinary contents	
		Number of joint/dual degree Bachelor programmes with European HEIs per HEI and/or per department/institute and/or per subject field	
		Number of joint/dual degree Master programmes with European HEIs per HEI and/or per department/institute and/or per subject field	
		Number of joint/dual degree Bachelor programmes with international HEIs (outside Europe) per HEI and/or per department/institute and/or per subject field	
		Number of joint/dual degree Master programmes with international HEIs (outside Europe) per HEI and/or per department/institute and/or per subject field	
		Disciplinary diversity	Number of subject fields in which students have graduated in the latest year (according to ISCED ²⁹ 97/2011 levels)
		Capacity patient beds for teaching (medicine)	Number of patient beds available for teaching in HEI hospital and affiliated hospitals per 100 students
Financial investment and income in L&T	Institutional expenditure	Percentage of total institutional expenditure dedicated to L&T activities (core education expenditure) (according to relevant quality criteria to be identified)	
		Percentage of total institutional expenditure dedicated to the provision of student services (other than accommodation and student allowance) (according to relevant quality criteria to be identified)	
		Percentage of total institutional expenditure dedicated to student accommodation and allowance (according to relevant quality criteria to be identified)	
		Percentage of total institutional expenditure dedicated to student loans/maintenance grants, especially for students that come from disadvantage backgrounds/minorities (according to relevant quality criteria to be identified)	
		Percentage of total institutional expenditure to recognise the needs of students who are working (according to relevant quality criteria to be identified)	
		Expenditure on information and communication technology (ICT) (according to relevant quality criteria to be identified) per HEI and/or per department/institute and/or per subject field and/or study programme, related to annual budget	
		Expenditure on ICT (according to relevant quality criteria to be identified) per full-time student	
		Expenditure on laboratory resources (according to relevant quality criteria to be identified) per HEI and/or per department/institute and/or per subject field and/or per study programme and/or per student, related to annual budget	
	Institutional income	Student fees per HEI and/or per department/institute and/or per subject field and/or per study programme, related to annual budget	
		Amount of third-party funding/extra funding income in L&T per HEI and/or per department/institute and/or per subject field and/or per study programme and/or per student (e.g. funded research projects for the advancement of L&T), related to annual budget	

²⁹ International Standard Classification of Education

Student places		Number of students allowed to enrol per HEI and/or per department/institute and/or per subject field and/or study programme
Students composition		Number and/or percentage of full-time Bachelor students enrolled per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of full-time Master students enrolled per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of full-time doctoral/PhD students enrolled per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of part-time Bachelor students enrolled per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of part-time Master students enrolled per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of part-time doctoral/PhD students enrolled per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of Bachelor students who are working part-time
		Number and/or percentage of Master students who are working part-time
		Number and/or percentage of doctoral/PhD students who are working part-time
		Number and/or percentage of Bachelor students who are working full-time
		Number and/or percentage of Master students who are working full-time
		Number and/or percentage of doctoral/PhD students who are working full-time
		Number and/or percentage of international (according to the citizenship or the residence at the moment of the enrolment/exchange) Bachelor students per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of international Master students per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of international doctoral/PhD students per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of international incoming exchange Bachelor students per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of international incoming exchange Master students per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of international incoming exchange doctoral/PhD students per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of international outgoing exchange Bachelor students per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of international outgoing exchange Master students per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of international outgoing exchange doctoral/PhD students per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of Bachelor students in international joint degree programmes per HEI and/or per department/institute and/or per subject field and/or study programme
		Number and/or percentage of Master students in international joint degree programmes per HEI and/or per department/institute and/or per subject field and/or study programme
Number and/or percentage of doctoral/PhD students in international joint degree programmes per HEI and/or per department/institute and/or per subject field and/or study programme		
Number and/or percentage of students with non-traditional background (exemplary criteria include low-income; non-academic families; disadvantaged ethnic and religious groups) per HEI and/or per department/institute and/or per subject field and/or study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)		
Gender ratio	Students	Gender ratio of Bachelor students enrolled per HEI and/or per department/institute and/or per subject field and/or per study programme
		Gender ratio of Bachelor students enrolled per HEI and/or per department/institute and/or per subject field and/or study programme who are working part-time
		Gender ratio of Bachelor students enrolled per HEI and/or per department/institute and/or per subject field and/or per study programme who are working full-time
		Gender ratio of Master students enrolled per HEI and/or per department/institute and/or per subject field and/or study programme
		Gender ratio of Master students enrolled per HEI and/or per department/institute and/or per subject field and/or per study programme who are working part-time
		Gender ratio of Master students enrolled per HEI and/or per department/institute and/or per subject field and/or per study programme who are working full-time
		Gender ratio of doctoral/PhD students enrolled per HEI and/or per department/institute and/or per subject field and/or per study programme
	Graduates	Gender ratio of students who complete a Bachelor per HEI and/or per department/institute and/or per subject field and/or per study programme

		Gender ratio of students who complete a Master per HEI and/or per department/institute and/or per subject field and/or per study programme
		Gender ratio of students who complete a doctorate/PhD per HEI and/or per department/institute and/or per subject field and/or per study programme
	Academic staff	Gender ratio of academic staff per HEI and/or per department/institute and/or per subject field and/or per study programme
Supportive environment	Administrative staff	Ratio of student number to FTE (full-time equivalent) administrative staff number per HEI and/or per department/institute and/or per subject field and/or per study programme
	e-management of the student life cycle	Quality of e-admission (e.g. digital student admission system (SAS)) (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Quality of Learning Analytics methodologies (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Quality of e-assessment (e.g. digital student assessment system) (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
	Special access offerings and facilities	Number and/or percentage of students who need special access offerings and facilities because of visual deficits including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of students who need special access offerings and facilities because of hearing deficits including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of students who need special access offerings and facilities because of mobility and other physical issues including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of students who need special access offerings and facilities because of dyslexia including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of students who need special access offerings and facilities because of autism including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
	Minority support	Number and/or percentage of students who need support due to ethnic minority status including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of students who need support due to religious minority status including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of students who need support due to social minority status including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
	Use of supportive network options of HEIs	Number and/or percentage of students who use networking options provided by the HEI that meet their social, political and cultural interests (according to relevant quality criteria to be identified, e.g. choir groups, orchestra groups, theatre groups, political discussion groups) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of students who use networking options provided by the HEI that meet their study interests (according to relevant quality criteria to be identified, e.g. student research groups) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of students who use networking options provided by the HEI that meet their practical world-of-work interests (according to relevant quality criteria to be identified, e.g. offers for organisation of internships) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
	Institutional recognition of teaching	Number and type of awards to recognise excellent teaching practices (according to relevant quality criteria to be identified)
		Number and type of institutional offerings for the promotion of teaching competences and teaching professionalism (exemplary criteria include continuing education for teachers; didactic certificates)
		Proportion of teaching staff who were rewarded for their outstanding engagement in teaching based on a merit system (according to relevant quality criteria to be identified)
	Learning support services	Quality of learning support services (according to relevant quality criteria to be identified) that could be assessed by SUSTEX and/or satisfaction surveys of incoming students
		Quality of writing centres (according to relevant quality criteria to be identified) that could be assessed by SUSTEX and/or satisfaction surveys of incoming students
		Quality of student welcome centres (according to relevant quality criteria to be identified) that could be assessed by SUSTEX and/or satisfaction surveys of incoming students
		Quality of digital learning management system (according to relevant quality criteria to be identified) that could be assessed by SUSTEX and/or satisfaction surveys of incoming students

		Quality of support for students from ethnic minorities (according to relevant quality criteria to be identified) that could be assessed by SUSTEX and/or satisfaction surveys of incoming students
		Quality of support for students from religious minorities (according to relevant quality criteria to be identified) that could be assessed by SUSTEX and/or satisfaction surveys of incoming students
		Quality of support for physically disabled students (according to relevant quality criteria to be identified) that could be assessed by SUSTEX and/or satisfaction surveys of incoming students
		Quality of support for refugee students (according to relevant quality criteria to be identified) that could be assessed by SUSTEX and/or satisfaction surveys of incoming students
		Quality of support for students who are working (according to relevant criteria to be identified) that could be assessed by SUSTEX and/or satisfaction surveys of incoming students
	Cross-border mobility	Quality of HEI offers and organisation for students cross-border mobility (e.g. short-period abroad; semester abroad; study programme abroad; student exchange; internship abroad; ...) (according to relevant quality criteria to be identified) that could be assessed by SUSTEX and/or satisfaction surveys of incoming students
	Recognition of qualifications	HEI recognition of (formal and non-formal) qualifications earned from other HEIs (according to relevant quality criteria to be identified) that could be assessed by SUSTEX and/or satisfaction surveys of incoming students
		HEI recognition of (formal and non-formal) qualifications earned outside higher education (according to relevant quality criteria to be identified) that could be assessed by SUSTEX and/or satisfaction surveys of incoming students
	Support of doctoral studies	Quality of structured doctoral programmes or individual doctorates (according to relevant criteria to be identified, e.g. supervision of the doctorate, adequate duration/adherence to the regular duration, academic networking and cooperation, academic publications) that could be assessed by doctoral/PhD students and/or teaching staff and/or experts/peers other than doctoral/PhD students and teaching staff
	Assurance of ethical integrity	Quality of information, education and measures to ensure ethical integrity in students' and academics' work in L&T (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Quality of information, education and measures to avoid plagiarism in students' and academics' work in L&T (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
	HEI support for student life outside the classroom and beyond the study programme	Quality of HEI activities to promote contact among students from different backgrounds (social, ethnic, religious) (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Quality of HEI provision of opportunities for students to be involved socially (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Quality of HEI provision of student support for managing non-academic responsibilities (e.g. work, family) (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Students' experience in discussions with diverse others (according to relevant quality criteria to be identified) that could be assessed by satisfaction surveys of students
		Quality of HEI support for overall well-being of students (according to relevant quality criteria to be identified, e.g. recreation, health care, sports, counselling) that could be assessed by SUSTEX
		Quality of campus activities and events for students (according to relevant quality criteria to be identified, e.g. performing arts, sports events) that could be assessed by SUSTEX
		Quality of HEI offers for students to attend events that address important social, economic, civil engagement, sustainability, or political issues (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Quality of HEI response to sexual harassment/violence/abuse (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
	Student interactions	With library
With courses		Students frequency of attending their compulsory courses (per event) (student attendance rate) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Students frequency of attending their non-compulsory courses (per event) (student attendance rate) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
With teaching staff		Number and duration of student interactions with teaching staff in the classroom per semester or study period including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)

		Number and duration of student interactions with teaching staff in teachers' offices per semester or study period including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and duration of student interactions with teaching staff on digital platforms per semester or study period including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and duration of student interactions with teaching staff during additional activities (e.g. research work, research camps, consultations, conferences) per semester or study period including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
	With digital platforms	Number and duration of digitised student interactions and/or average duration per visit with/at student admission system (SAS) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and duration of digitised student interactions and/or average duration per visit with/at student information system (SIS) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and duration of digitised student interactions and/or average duration per visit with other students (e.g. via the HEI's LMS) including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
Quality of incoming students	Entrance test	Number and/or percentage of study programmes with an entrance test that must be passed in order to enrol in that programme
	Entrance and admission score	Students' entrance grades per study programme, including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Students' secondary school grades per study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Students' grades of HEI admission tests per study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
Attraction of students with external graduation from other HEI		Students' grades of introductory courses and/or examinations (e.g. in mathematics, languages) per study programme including the lawful protection of the use of students' personalised data for Learning Analytics (PDRLA)
		Number and/or percentage of enrolled Bachelor students who have completed previous studies at another HEI
		Number and/or percentage of enrolled Master students who have completed previous studies at another HEI
Continuing education and lifelong learning		Number and/or percentage of enrolled doctoral/PhD students who have completed previous studies at another HEI
		Quality of offers for continuing education and lifelong learning (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
Stakeholder participation in L&T quality development and evaluation ³⁰		Compatibility of studies and work (according to relevant criteria to be identified, e.g. flexible models for adapting study times to working hours, recognition of non-academic achievements, mediation of motivation for lifelong learning) that could be assessed by SUSTEX
		Participation of stakeholders (e.g. students, teaching staff) in evaluations of courses and teaching (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Participation of stakeholders (e.g. students, teaching staff) in decision-making related to student evaluations of courses and teaching (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
Governance/strategy	Mission, vision and values ("mission statement")	Participation of stakeholders (e.g. students, teaching staff, researchers, employers) in curriculum development (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
	Further strategy and policy documents (including operational levels)	Quality of mission, vision and values in L&T (face-to-face, hybrid, online) on institutional and/or faculty and/or programme levels (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
	Public information about L&T	Quality of strategy and policy documents in L&T (face-to-face, hybrid, online) on different organisational levels such as HEI, faculties, departments (e.g. structure and development plans for L&T; institutional and faculty level policy documents such as Learning Analytics Policy, Evaluation Policy for L&T, Data and Information Ethics Policy; QM system including a L&T model) (according to relevant quality criteria to be identified) that could be assessed by SUSTEX
		Quality of public information about study programmes (e.g. recognition of qualifications, learning objectives, credits, requirements, assessment methods, timelines, dates relevant for the programme, completion rates, pass rates, and dropout rates)

³⁰ These performance types and related PIs are of particular relevance in the context of interdisciplinary and transdisciplinary L&T and sustainability L&T, i.e. Higher Education for Sustainable Development (HESD).

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Appendix: Higher Education for Sustainable Development (HESD) learning goals

In Table 3a, 255 (=5x3x17) competences alias learning goals of Higher Education for Sustainability Development (HESD) are listed. These competences are differentiated according to the UNESCO's 17 Sustainability Development Goals (SDGs) and the sub-groups of cognitive, socio-emotional and behavioural competences related to each SDG and are taken from (UNESCO 2017, pp. 12ff.). These competences/learning goals are referred to in Table 3 ("PIs for Learning Outcomes and Learning Gain and Their Assessment") under the performance type "Student learning gain with respect to Higher Education for Sustainable Development (HESD) competences".

The inclusion of PIs for HESD in this comprehensive PI set of L&T in higher education is due to the simple facts that the PI set of the SQELT project should be comprehensive and that sustainability of all forms of life and non-living matter is one of the crucial issues of our time (cf. e.g. Albareda-Tiana et al. 2018; Bellina et al. 2018; Caeiro et al. 2020; Findler et al. 2019; Rieckmann & Bormann 2020; RNE 2018; Tapia-Fonllem et al. 2017). In this sense, the SQELT PI set adopts the UNESCO's understanding that

'to create a more sustainable world and to engage with issues related to sustainability as described in the Sustainable Development Goals (SDGs), individuals must become sustainability change-makers. They require the knowledge, skills, values and attitudes that empower them to contribute to sustainable development. [Higher] Education is thus crucial for the achievement of sustainable development, and [Higher] Education for Sustainable Development [HESD] is particularly needed because it empowers learners to take informed decisions and act responsibly for environmental integrity, economic viability and a just society, for present and future generations' (UNESCO 2017, p. 63).

It should be noted that the adoption of the UNESCO's (H)ESD learning goals alias competences as written down in Table 3a does not imply the assumption that the latter are perfect, finalised or completely non-redundant. Instead, it is generally assumed here that the (H)ESD learning competences listed in Table 3a are improvable and that the underlying SDGs as such may contain contradictory issues as well (cf. e.g. Hickel 2019). However, this does not diminish the basic opportunities and benefits of the SDGs and (H)ESD competences for the theme of PIs of higher education L&T, while further critical analysis of the SDG-related competences is beyond the present project's capabilities. Finally, it is certainly worthwhile noting that the general goal of Education for Sustainable Development is based on, imbedded into and justified by the philosophy of human rights, particularly the values of Enlightenment including the conceptions of freedom of expression, learning, research and the arts, and the Universal Declaration of Human Rights (e.g. UNGA 1948; 2008).

Table 3a: Higher Education for Sustainable Development (HESD) learning goals and competences, respectively (adopted from UNESCO 2017, pp. 12ff.)

SDG1-related competences ('No poverty')	Cognitive	The student knows ³¹ about and understands the 'concepts of extreme and relative poverty and is able to critically reflect on their underlying cultural and normative assumptions.' ³²
		The student knows about and understands the 'local, national and global distribution of extreme poverty and extreme wealth.'
		The student knows about and understands the 'causes and impacts of poverty such as unequal distribution of resources and power, colonization, conflicts, disasters caused by natural hazards and other climate change-induced impacts, environmental degradation and technological disasters, and the lack of social protection systems and measures.'
		The student knows about and understands 'how extremes of poverty and extremes of wealth affect basic human rights and needs.'
		The student knows about and understands 'poverty reduction strategies and measures and is able to distinguish between deficit-based and strength-based approaches to addressing poverty.'
	Socio-emotional	The student 'is able to collaborate with others to empower individuals and communities to affect change in the distribution of power and resources in the community and beyond.'
		The student 'is able to raise awareness about extremes of poverty and wealth and encourage dialogue about solutions.'

³¹ "Knowing" and "understanding" (or "comprehending") denote the two lowest levels of the five cognitive levels of Bloom's taxonomy: Knowledge; Comprehension; Application; Analysis; Synthesis, Evaluation (cf. Anderson et al., 2013).

³² This and the following citations in Table 3a are taken from (UNESCO 2017, pp. 12ff.).

		The student 'is able to show sensitivity to the issues of poverty as well as empathy and solidarity with poor people and those in vulnerable situations.'	
		The student 'is able to identify their personal experiences and biases with respect to poverty.'	
		The student 'is able to reflect critically on their own role in maintaining global structures of inequality.'	
	Behavioural	The student 'is able to plan, implement, evaluate and replicate activities that contribute to poverty reduction.'	
		The student 'is able to publicly demand and support the development and integration of policies that promote social and economic justice, risk reduction strategies and poverty eradication actions.'	
		The student 'is able to evaluate, participate in and influence decision-making related to management strategies of local, national and international enterprises concerning poverty generation and eradication.'	
		The student 'is able to include poverty reduction, social justice and anti-corruption considerations in their consumption activities.'	
	The student 'is able to propose solutions to address systemic problems related to poverty.'		
SDG2-related competences ('Zero hunger')	Cognitive	The student knows about and understands 'hunger and malnutrition and their main physical and psychological effects on human life, and about specific vulnerable groups.'	
		The student knows about and understands 'the amount and distribution of hunger and malnutrition locally, nationally and globally, currently as well as historically.'	
		The student knows about and understands 'the main drivers and root causes for hunger at the individual, local, national and global level.'	
		The student knows about and understands 'principles of sustainable agriculture and understands the need for legal rights to have land and property as necessary conditions to promote it.'	
		The student knows about and understands 'the need for sustainable agriculture to combat hunger and malnutrition worldwide and knows about other strategies to combat hunger, malnutrition and poor diets.'	
	Socio-emotional	The student 'is able to communicate on the issues and connections between combating hunger and promoting sustainable agriculture and improved nutrition.'	
		The student 'is able to collaborate with others to encourage and to empower them to combat hunger and to promote sustainable agriculture and improved nutrition.'	
		The student 'is able to create a vision for a world without hunger and malnutrition.'	
		The student 'is able to reflect on their own values and deal with diverging values, attitudes and strategies in relation to combating hunger and malnutrition and promoting sustainable agriculture.'	
	Behavioural	The student 'is able to feel empathy, responsibility and solidarity for and with people suffering from hunger and malnutrition.'	
		The student 'is able to evaluate and implement actions personally and locally to combat hunger and to promote sustainable agriculture.'	
		The student 'is able to evaluate, participate in and influence decision-making related to public policies concerning the combat against hunger and malnutrition and the promotion of sustainable agriculture.'	
		The student 'is able to evaluate, participate in and influence decision-making related to management strategies of local, national and international enterprises concerning the combat against hunger and malnutrition and the promotion of sustainable agriculture.'	
		The student 'is able to take on critically their role as an active global citizen in the challenge of combating hunger.'	
		The student 'is able to change their production and consumption practices in order to contribute to the combat against hunger and the promotion of sustainable agriculture.'	
	SDG3-related competences ('Good health and well-being')	Cognitive	The student knows about and understands 'conceptions of health, hygiene and well-being and can critically reflect on them, including an understanding of the importance of gender in health and well-being.'
			The student knows about and understands 'facts and figures about the most severe communicable and noncommunicable diseases, and the most vulnerable groups and regions concerning illness, disease and premature death.'
			The student knows about and understands 'the socio-political-economic dimensions of health and well-being and knows about the effects of advertising and about strategies to promote health and well-being.'
			The student knows about and understands 'the importance of mental health' including 'the negative impacts of behaviours like xenophobia, discrimination and bullying on mental health and emotional well-being and how addictions to alcohol, tobacco or other drugs cause harm to health and well-being.'
			The student knows about and understands 'relevant prevention strategies to foster positive physical and mental health and well-being, including sexual and reproductive health and information as well as early warning and risk reduction.'
Socio-emotional		The student 'is able to interact with people suffering from illnesses, and feel empathy for their situation and feelings.'	
		The student 'is able to communicate about issues of health, including sexual and reproductive health, and well-being, especially to argue in favour of prevention strategies to promote health and well-being.'	
		The student 'is able to encourage others to decide and act in favour of promoting health and well-being for all.'	
		The student 'is able to create a holistic understanding of a life of health and well-being, and to clarify related values, beliefs and attitudes.'	
		The student 'is able to develop a personal commitment to promoting health and well-being for themselves, their family and others, including considering volunteer or professional work in health and social care.'	
Behavioural		The student 'is able to include health promoting behaviours in their daily routines.'	

		The student 'is able to plan, implement, evaluate and replicate strategies that promote health, including sexual and reproductive health, and well-being for themselves, their families and others.'
		The student 'has the capacity to perceive when others need help and to seek help for themselves and others.'
		The student 'is able to publicly demand and support the development of policies promoting health and well-being.'
		The student 'is able to propose ways to address possible conflicts between the public interest in offering medicine at affordable prices and private interests within the pharmaceutical industry.'
SDG4-related competences ('Quality education')	Cognitive	The student knows about and understands 'the important role of education and lifelong learning opportunities for all (formal, non-formal and informal learning) as main drivers of sustainable development, for improving people's lives and in achieving the SDGs.'
		The student knows about and understands 'education as a public good, a global common good, a fundamental human right and a basis for guaranteeing the realization of other rights.'
		The student knows about and understands 'inequality in access to and attainment of education, particularly between girls and boys and in rural areas, and about reasons for a lack of equitable access to quality education and lifelong learning opportunities.'
		The student knows about and understands 'the important role of culture in achieving sustainability.'
		The student knows about and understands 'that education can help create a more sustainable, equitable and peaceful world.'
	Socio-emotional	The student 'is able to raise awareness of the importance of quality education for all, a humanistic and holistic approach to education, ESD and related approaches.'
		The student 'is able through participatory methods to motivate and empower others to demand and use educational opportunities.'
		The student 'is able to recognize the intrinsic value of education and to analyse and identify their own learning needs in their personal development.'
		The student 'is able to recognize the importance of their own skills for improving their life, in particular for employment and entrepreneurship.'
		The student 'is able to engage personally with ESD.'
	Behavioural	The student 'is able to contribute to facilitating and implementing quality education for all, ESD and related approaches at different levels.'
		The student 'is able to promote gender equality in education.'
		The student 'is able to publicly demand and support the development of policies promoting free, equitable and quality education for all, ESD and related approaches as well as aiming at safe, accessible and inclusive educational facilities.'
		The student 'is able to promote the empowerment of young people.'
		The student 'is able to use all opportunities for their own education throughout their life, and to apply the acquired knowledge in everyday situations to promote sustainable development.'
SDG5-related competences ('Gender equality')	Cognitive	The student knows about and understands 'the concept of gender, gender equality and gender discrimination and knows about all forms of gender discrimination, violence and inequality (e.g. harmful practices such as female genital mutilation, honour killings and child marriage, unequal employment opportunities and pay, language construction, traditional gender roles, gendered impact of natural hazards) and understands the current and historical causes of gender inequality.'
		The student knows about and understands 'the basic rights of women and girls, including their right to freedom from exploitation and violence and their reproductive rights.'
		The student knows about and understands 'levels of gender equality within their own country and culture in comparison to global norms (while respecting cultural sensitivity), including the intersectionality of gender with other social categories such as ability, religion and race.'
		The student knows about and understands 'the opportunities and benefits provided by full gender equality and participation in legislation and governance, including public budget allocation, the labour market and public and private decision-making.'
		The student knows about and understands 'the role of education, enabling technology and legislation in empowering and ensuring the full participation of all genders.'
	Socio-emotional	The student 'is able to recognize and question traditional perception of gender roles in a critical approach, while respecting cultural sensitivity.'
		The student 'is able to identify and speak up against all forms of gender discrimination and debate the benefits of full empowerment of all genders.'
		The student 'is able to connect with others who work to end gender discrimination and violence, empower those who may still be disempowered and promote respect and full equality on all levels.'
		The student 'is able to reflect on their own gender identity and gender roles.'
		The student 'is able to feel empathy and solidarity with those who differ from personal or community gender expectations and roles.'
	Behavioural	The student 'is able to take the measure of their surroundings to empower themselves or others who are discriminated against because of their gender.'
		The student 'is able to evaluate, participate in and influence decision-making about gender equality and participation.'
		The student 'is able to support others in developing empathy across genders and breaking down gender discrimination and violence.'
		The student 'is able to observe and identify gender discrimination.'

		The student 'is able to plan, implement, support and evaluate strategies for gender equality.'
SDG6-related competences ('Clean water and sanitation')	Cognitive	The student knows about and understands 'water as a fundamental condition of life itself, the importance of water quality and quantity, and the causes, effects and consequences of water pollution and water scarcity.'
		The student knows about and understands 'that water is part of many different complex global interrelationships and systems.'
		The student knows about and understands 'the global unequal distribution of access to safe drinking water and sanitation facilities.'
		The student knows about and understands 'the concept of "virtual water".'
		The student knows about and understands 'the concept of Integrated Water Resources Management (IWRM) and other strategies for ensuring the availability and sustainable management of water and sanitation, including flood and drought risk management.'
	Socio-emotional	The student 'is able to participate in activities of improving water and sanitation management in local communities.'
		The student 'is able to communicate about water pollution, water access and water saving measures and to create visibility about success stories.'
		The student 'is able to feel responsible for their water use.'
		The student 'is able to see the value in good sanitation and hygiene standards.'
		The student 'is able to question socio-economic differences as well as gender disparities in the access to safe drinking water and sanitation facilities.'
	Behavioural	The student 'is able to cooperate with local authorities in the improvement of local capacity for self-sufficiency.'
		The student 'is able to contribute to water resources management at the local level.'
		The student 'is able to reduce their individual water footprint and to save water practicing their daily habits.'
		The student 'is able to plan, implement, evaluate and replicate activities that contribute to increasing water quality and safety.'
The student 'is able to evaluate, participate in and influence decision-making on management strategies of local, national and international enterprises related to water pollution.'		
SDG7-related competences ('Affordable and clean energy')	Cognitive	The student knows about and understands 'different energy resources – renewable and non-renewable – and their respective advantages and disadvantages including environmental impacts, health issues, usage, safety and energy security, and their share in the energy mix at the local, national and global level.'
		The student knows about and understands 'what energy is primarily used for in different regions of the world.'
		The student knows about and understands 'the concept of energy efficiency and sufficiency and knows socio-technical strategies and policies to achieve efficiency and sufficiency.'
		The student knows about and understands 'how policies can influence the development of energy production, supply, demand and usage.'
		The student knows about and understands 'harmful impacts of unsustainable energy production, understands how renewable energy technologies can help to drive sustainable development and understands the need for new and innovative technologies and especially technology transfer in collaborations between countries.'
	Socio-emotional	The student 'is able to communicate the need for energy efficiency and sufficiency.'
		The student 'is able to assess and understand the need for affordable, reliable, sustainable and clean energy of other people/other countries or regions.'
		The student 'is able to cooperate and collaborate with others to transfer and adapt energy technologies to different contexts and to share energy best practices of their communities.'
		The student 'is able to clarify personal norms and values related to energy production and usage as well as to reflect and evaluate their own energy usage in terms of efficiency and sufficiency.'
		The student 'is able to develop a vision of a reliable, sustainable energy production, supply and usage in their country.'
	Behavioural	The student 'is able to apply and evaluate measures in order to increase energy efficiency and sufficiency in their personal sphere and to increase the share of renewable energy in their local energy mix.'
		The student 'is able to apply basic principles to determine the most appropriate renewable energy strategy in a given situation.'
		The student 'is able to analyse the impact and long-term effects of big energy projects (e.g. constructing an off-shore wind park) and energy related policies on different stakeholder groups (including nature) .'
		The student 'is able to influence public policies related to energy production, supply and usage.'
The student 'is able to compare and assess different business models and their suitability for different energy solutions and to influence energy suppliers to produce safe, reliable and sustainable energy.'		
SDG8-related competences ('Decent work and economic growth')	Cognitive	The student knows about and understands 'the concepts of sustained, inclusive and sustainable economic growth, full and productive employment, and decent work, including the advancement of gender parity and equality, and knows about alternative economic models and indicators.'
		The student knows about and understands 'the distribution of formal employment rates per sector, informal employment, and unemployment in different world regions or nations, and which social groups are especially affected by unemployment.'

		The student knows about and understands 'the relation between employment and economic growth and knows about other moderating factors like a growing labour force or new technologies that substitute jobs.'	
		The student knows about and understands 'how low and decreasing wages for the labour force and very high wages and profits of managers and owners or shareholders are leading to inequalities, poverty, civil unrest, etc.'	
		The student knows about and understands 'how innovation, entrepreneurship and new job creation can contribute to decent work and a sustainability-driven economy and to the decoupling of economic growth from the impacts of natural hazards and environmental degradation.'	
	Socio-emotional	The student 'is able to discuss economic models and future visions of economy and society critically and to communicate them in public spheres.'	
		The student 'is able to collaborate with others to demand fair wages, equal pay for equal work and labour rights from politicians and from their employer.'	
		The student 'is able to understand how one's own consumption affects working conditions of others in the global economy.'	
		The student 'is able to identify their individual rights and clarify their needs and values related to work.'	
	Behavioural	The student 'is able to develop a vision and plans for their own economic life based on an analysis of their competencies and contexts.'	
		The student 'is able to engage with new visions and models of a sustainable, inclusive economy and decent work.'	
		The student 'is able to facilitate improvements related to unfair wages, unequal pay for equal work and bad working conditions.'	
		The student 'is able to develop and evaluate ideas for sustainability-driven innovation and entrepreneurship.'	
		The student 'is able to plan and implement entrepreneurial projects.'	
	The student 'is able to develop criteria and make responsible consumption choices as a means to support fair working conditions and efforts to decouple production from the impact of natural hazards and environmental degradation.'		
SDG9-related competences ('Industry, innovation and infrastructure')	Cognitive	The student knows about and understands 'the concepts of sustainable infrastructure and industrialization and society's needs for a systemic approach to their development.'	
		The student knows about and understands 'the local, national and global challenges and conflicts in achieving sustainability in infrastructure and industrialization.'	
		The student 'can define the term resilience in the context of infrastructure and spatial planning, understanding key concepts such as modularity and diversity, and apply it to their local community and nationwide.'	
		The student knows about and understands 'the pitfalls of unsustainable industrialization and in contrast knows examples of resilient, inclusive, sustainable industrial development and the need for contingency planning.'	
		The student 'is aware of new opportunities and markets for sustainability innovation, resilient infrastructure and industrial development.'	
	Socio-emotional	The student 'is able to argue for sustainable, resilient and inclusive infrastructure in their local area.'	
		The student 'is able to encourage their communities to shift their infrastructure and industrial development toward more resilient and sustainable forms.'	
		The student 'is able to find collaborators to develop sustainable and contextual industries that respond to our shifting challenges and also to reach new markets.'	
		The student 'is able to recognize and reflect on their own personal demands on the local infrastructure such as their carbon and water footprints and food miles.'	
		The student 'is able to understand that with changing resource availability (e. g. peak oil, peak everything) and other external shocks and stresses (e. g. natural hazards, conflicts) their own perspective and demands on infrastructure may need to shift radically regarding availability of renewable energy for ICT, transport options, sanitation options, etc.'	
	Behavioural	The student 'is able to identify opportunities in their own culture and nation for greener and more resilient approaches to infrastructure, understanding their overall benefits for societies, especially with regard to disaster risk reduction.'	
		The student 'is able to evaluate various forms of industrialization and compare their resilience.'	
		The student 'is able to innovate and develop sustainable enterprises to respond to their countries' industrial needs.'	
		The student 'is able to access financial services such as loans or microfinance to support their own enterprises.'	
		The student 'is able to work with decision-makers to improve the uptake of sustainable infrastructure (including internet access) .'	
	SDG10-related competences ('Reduced inequalities')	Cognitive	The student knows about and understands 'different dimensions of inequality, their interrelations and applicable statistics.'
			The student knows about and understands 'indicators that measure and describe inequalities and understands their relevance for decision-making.'
			The student knows about and understands 'that inequality is a major driver for societal problems and individual dissatisfaction.'

		The student knows about and understands 'local, national and global processes that both promote and hinder equality (fiscal, wage, and social protection policies, corporate activities, etc.).'	
		The student knows about and understands 'ethical principles concerning equality and is aware of psychological processes that foster discriminative behaviour and decision making.'	
	Socio-emotional	The student 'is able to raise awareness about inequalities.'	
		The student 'is able to feel empathy for and to show solidarity with people who are discriminated against.'	
		The student 'is able to negotiate the rights of different groups based on shared values and ethical principles.'	
		The student 'becomes aware of inequalities in their surroundings as well as in the wider world and is able to recognize the problematic consequences.'	
		The student 'is able to maintain a vision of a just and equal world.'	
	Behavioural	The student 'is able to evaluate inequalities in their local environment in terms of quality (different dimensions, qualitative impact on individuals) and quantity (indicators, quantitative impact on individuals) .'	
		The student 'is able to identify or develop an objective indicator to compare different groups, nations, etc. with respect to inequalities.'	
		The student 'is able to identify and analyse different types of causes and reasons for inequalities.'	
The student 'is able to plan, implement and evaluate strategies to reduce inequalities.'			
The student 'is able to engage in the development of public policies and corporate activities that reduce inequalities.'			
SDG11-related competences ('Sustainable cities and communities')	Cognitive	The student knows about and understands 'basic physical, social and psychological human needs and is able to identify how these needs are currently addressed in their own physical urban, peri-urban and rural settlements.'	
		The student knows about and understands 'to evaluate and compare the sustainability of their and other settlements' systems in meeting their needs particularly in the areas of food, energy, transport, water, safety, waste treatment, inclusion and accessibility, education, integration of green spaces and disaster risk reduction.'	
		The student knows about and understands 'the historical reasons for settlement patterns and while respecting cultural heritage, understands the need to find compromises to develop improved sustainable systems.'	
		The student knows about and understands 'the basic principles of sustainable planning and building, and can identify opportunities for making their own area more sustainable and inclusive.'	
		The student knows about and understands 'the role of local decision-makers and participatory governance and the importance of representing a sustainable voice in planning and policy for their area.'	
	Socio-emotional	The student 'is able to use their voice, to identify and use entry points for the public in the local planning systems, to call for the investment in sustainable infrastructure, buildings and parks in their area and to debate the merits of long-term planning.'	
		The student 'is able to connect with and help community groups locally and online in developing a sustainable future vision of their community.'	
		The student 'is able to reflect on their region in the development of their own identity, understanding the roles that the natural, social and technical environments have had in building their identity and culture.'	
		The student 'is able to contextualize their needs within the needs of the greater surrounding ecosystems, both locally and globally, for more sustainable human settlements.'	
		The student 'is able to feel responsible for the environmental and social impacts of their own individual lifestyle.'	
	Behavioural	The student 'is able to plan, implement and evaluate community-based sustainability projects.'	
		The student 'is able to participate in and influence decision processes about their community.'	
		The student 'is able to speak against/for and to organize their voice against/for decisions made for their community.'	
		The student 'is able to co-create an inclusive, safe, resilient and sustainable community.'	
		The student 'is able to promote low carbon approaches at the local level.'	
	SDG12-related competences ('Responsible consumption and production')	Cognitive	The student knows about and understands 'how individual lifestyle choices influence social, economic and environmental development.'
			The student knows about and understands 'production and consumption patterns and value chains and the interrelatedness of production and consumption (supply and demand, toxics, CO ₂ emissions, waste generation, health, working conditions, poverty, etc.) .'
			The student knows about and understands 'roles, rights and duties of different actors in production and consumption (media and advertising, enterprises, municipalities, legislation, consumers, etc.) .'
The student knows about and understands 'strategies and practices of sustainable production and consumption.'			
The student knows about and understands 'dilemmas/trade-offs related to and system changes necessary for achieving sustainable consumption and production.'			
Socio-emotional		The student 'is able to communicate the need for sustainable practices in production and consumption.'	
		The student 'is able to encourage others to engage in sustainable practices in consumption and production.'	
		The student 'is able to differentiate between needs and wants and to reflect on their own individual consumer behaviour in light of the needs of the natural world, other people, cultures and countries, and future generations.'	

	Behavioural	The student 'is able to envision sustainable lifestyles.'		
		The student 'is able to feel responsible for the environmental and social impacts of their own individual behaviour as a producer or consumer.'		
		The student 'is able to plan, implement and evaluate consumption-related activities using existing sustainability criteria.'		
		The student 'is able to evaluate, participate in and influence decision-making processes about acquisitions in the public sector.'		
		The student 'is able to promote sustainable production patterns.'		
		The student 'is able take on critically on their role as an active stakeholder in the market.'		
SDG13-related competences ('Climate action')	Cognitive	The student 'is able to challenge cultural and societal orientations in consumption and production.'		
		The student knows about and understands 'the greenhouse effect as a natural phenomenon caused by an insulating layer of greenhouse gases.'		
		The student knows about and understands 'the current climate change as an anthropogenic phenomenon resulting from the increased greenhouse gas emissions.'		
		The student knows about and understands 'which human activities – on a global, national, local and individual level – contribute most to climate change.'		
		The student knows about and understands 'the main ecological, social, cultural and economic consequences of climate change locally, nationally and globally and understands how these can themselves become catalysing, reinforcing factors for climate change.'		
	Socio-emotional	The student knows about and understands 'prevention, mitigation and adaptation strategies at different levels (global to individual) and for different contexts and their connections with disaster response and disaster risk reduction.'		
		The student 'is able to explain ecosystem dynamics and the environmental, social, economic and ethical impact of climate change.'		
		The student 'is able to encourage others to protect the climate.'		
		The student 'is able to collaborate with others and to develop commonly agreed-upon strategies to deal with climate change.'		
		The student 'is able to understand their personal impact on the world's climate, from a local to a global perspective.'		
	Behavioural	The student 'is able to recognize that the protection of the global climate is an essential task for everyone and that we need to completely re-evaluate our worldview and everyday behaviours in light of this.'		
		The student 'is able to evaluate whether their private and job activities are climate friendly and – where not – to revise them.'		
		The student 'is able to act in favour of people threatened by climate change.'		
		The student 'is able to anticipate, estimate and assess the impact of personal, local and national decisions or activities on other people and world regions.'		
		The student 'is able to promote climate-protecting public policies.'		
		The student 'is able to support climate-friendly economic activities.'		
		SDG14-related competences ('Life below water')	Cognitive	The student knows about and understands 'basic marine ecology, ecosystems, predator-prey relationships, etc.'
				The student knows about and understands 'the connection of many people to the sea and the life it holds, including the sea's role as a provider of food, jobs and exciting opportunities.'
The student knows about and understands 'the basic premise of climate change and the role of the oceans in moderating our climate.'				
The student knows about and understands 'threats to ocean systems such as pollution and overfishing and recognizes and can explain the relative fragility of many ocean ecosystems including coral reefs and hypoxic dead zones.'				
The student knows about and understands 'about opportunities for the sustainable use of living marine resources.'				
Socio-emotional	The student 'is able to argue for sustainable fishing practices.'			
	The student 'is able to show people the impact humanity is having on the oceans (biomass loss, acidification, pollution, etc.) and the value of clean healthy oceans.'			
	The student 'is able to influence groups that engage in unsustainable production and consumption of ocean products.'			
	The student 'is able to reflect on their own dietary needs and question whether their dietary habits make sustainable use of limited resources of seafood.'			
Behavioural	The student 'is able to empathize with people whose livelihoods are affected by changing fishing practices.'			
	The student 'is able to research their country's dependence on the sea.'			
	The student 'is able to debate sustainable methods such as strict fishing quotas and moratoriums on species in danger of extinction.'			
	The student 'is able to identify, access and buy sustainably harvested marine life, e.g. ecolabel certified products.'			
	The student 'is able to contact their representatives to discuss overfishing as a threat to local livelihoods.'			
		The student 'is able to campaign for expanding no-fish zones and marine reserves and for their protection on a scientific basis.'		

SDG15-related competences ('Life on land')	Cognitive	The student knows about and understands 'basic ecology with reference to local and global ecosystems, identifying local species and understanding the measure of biodiversity.'
		The student knows about and understands 'the manifold threats posed to biodiversity, including habitat loss, deforestation, fragmentation, overexploitation and invasive species, and can relate these threats to their local biodiversity.'
		The student knows about and understands 'to classify the ecosystem services of the local ecosystems including supporting, provisioning, regulating and cultural services and ecosystems services for disaster risk reduction.'
		The student knows about and understands 'the slow regeneration of soil and the multiple threats that are destroying and removing it much faster than it can replenish itself, such as poor farming or forestry practice.'
		The student knows about and understands 'that realistic conservation strategies work outside pure nature reserves to also improve legislation, restore degraded habitats and soils, connect wildlife corridors, sustainable agriculture and forestry, and redress humanity's relationship to wildlife.'
	Socio-emotional	The student 'is able to argue against destructive environmental practices that cause biodiversity loss.'
		The student 'is able to argue for the conservation of biodiversity on multiple grounds including ecosystems services and intrinsic value.'
		The student 'is able to connect with their local natural areas and feel empathy with nonhuman life on Earth.'
		The student 'is able to question the dualism of human/nature and realizes that we are a part of nature and not apart from nature.'
		The student 'is able to create a vision of a life in harmony with nature.'
	Behavioural	The student 'is able to connect with local groups working toward biodiversity conservation in their area.'
		The student 'is able to effectively use their voice effectively in decision-making processes to help urban and rural areas become more permeable to wildlife through the establishment of wildlife corridors, agro-environmental schemes, restoration ecology and more.'
		The student 'is able to work with policy-makers to improve legislation for biodiversity and nature conservation, and its implementation.'
		The student 'is able to highlight the importance of soil as our growing material for all food and the importance of remediating or stopping the erosion of our soils.'
		The student 'is able to campaign for international awareness of species exploitation and work for the implementation and development of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) regulations.'
SDG16-related competences ('Peace, justice and strong institutions')	Cognitive	The student knows about and understands 'concepts of justice, inclusion and peace and their relationship to law.'
		The student knows about and understands 'their local and national legislative and governance systems, how they represent them and that they can be abused through corruption.'
		The student knows about and understands how 'to compare their system of justice with those of other countries.'
		The student knows about and understands 'the importance of individuals and groups in upholding justice, inclusion and peace and supporting strong institutions in their country and globally.'
		The student knows about and understands 'the importance of the international human rights framework.'
	Socio-emotional	The student 'is able to connect with others who can help them in facilitating peace, justice, inclusion and strong institutions in their country.'
		The student 'is able to debate local and global issues of peace, justice, inclusion and strong institutions.'
		The student 'is able to show empathy with and solidarity for those suffering from injustice in their own country as well as in other countries.'
		The student 'is able to reflect on their role in issues of peace, justice, inclusion and strong institutions.'
		The student 'is able to reflect on their own personal belonging to diverse groups (gender, social, economic, political, ethnical, national, ability, sexual orientation etc.) their access to justice and their shared sense of humanity.'
	Behavioural	The student 'is able to critically assess issues of peace, justice, inclusion and strong institutions in their region, nationally and globally.'
		The student 'is able to publicly demand and support the development of policies promoting peace, justice, inclusion and strong institutions.'
		The student 'is able to collaborate with groups that are currently experiencing injustice and/or conflicts.'
		The student 'is able to become an agent of change in local decision-making, speaking up against injustice.'
		The student 'is able to contribute to conflict resolution at the local and national level.'
SDG17-related competences ('Partnership for the goals')	Cognitive	The student knows about and understands 'global issues, including issues of financing for development, taxation, debt and trade policies, and the interconnectedness and interdependency of different countries and populations.'
		The student knows about and understands the 'importance of global multi-stakeholder partnerships and the shared accountability for sustainable development and knows examples of networks, institutions, campaigns of global partnerships.'
		The student knows about and understands the 'concepts of global governance and global citizenship.'
		The student knows about and understands the 'importance of cooperation on and access to science, technology and innovation, and knowledge sharing.'

		The student knows about and understands 'concepts for measuring progress on sustainable development.'
	Socio-emotional	The student 'is able to raise awareness about the importance of global partnerships for sustainable development.'
		The student 'is able to work with others to promote global partnerships for sustainable development and demand governments' accountability for the SDGs.'
		The student 'is able to take ownership of the SDGs.'
		The student 'is able to create a vision for a sustainable global society.'
		The student 'is able to experience a sense of belonging to a common humanity, sharing values and responsibilities, based on human rights.'
	Behavioural	The student 'is able to become a change agent to realize the SDGs and to take on their role as an active, critical and global and sustainability citizen.'
		The student 'is able to contribute to facilitating and implementing local, national and global partnerships for sustainable development.'
		The student 'is able to publicly demand and support the development of policies promoting global partnerships for sustainable development.'
		The student 'is able to support development cooperation activities.'
		The student 'is able to influence companies to become part of global partnerships for sustainable development.'